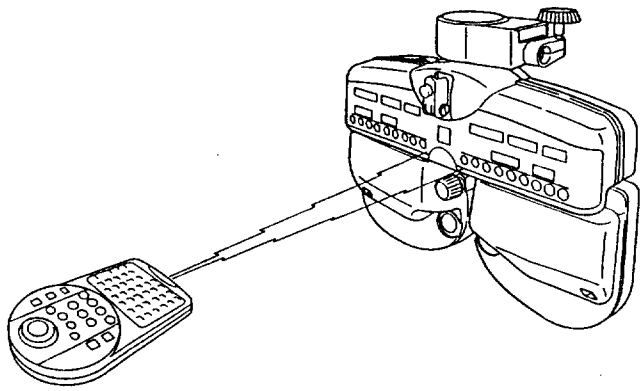
Nikon

Auto Optester

Remote Vision

Repair Manual

DCA00700



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1 Introduction

1－1 Features of Remote Vision

1) Operable with a remote controller for all operations of changing charts and lenses.
2) Operable anywhere, regardless of the position or posture of patients due to the wireless remote controller.
3) Filed angle 36 degree, widest in the world.
4) Direct data transmission from Retinomax by wireless communication.

2 Remote Vision Overview

2－1 General Specifications

Main Unit (Lens Chamber) DCA00700

Spherical power
Measurement range: -29.00D to +26.75D
Measurement step : 0.25D (selectable from 0.125D and 0.25D)

Cylindrical power
Measurement range: -7 to +7D
Measurement step : 0.25D

Cylindrical axis power
Measurement range: 0 to 180°
Measurement step : 5° (selectable from 1° , 5° , and 45°)

Prism
Measurement range: 0 to 20△ (all directions)
The measurement range totals to 0△ to 20△ when the 6U101 recos plate is used.
Measurement step : 0.5△ step, one eye (selectable from 0.5△ and 1△)

Cross cylinder
Auto cross: ±0.25D
Cross cylinder: Selectable from ±0.25D and ±0.50D

Auxiliary lenses 11types

For Left Eye	For Right Eye
Open	Open
Occlusion	Occlusion
Retinoscopy lens +1.5 (2.0) D	Retinoscopy lens +1.5 (2.0) D
Presbyopia cross cylinder ±0.5D	Presbyopia cross cylinder ±0.5D
Red maddox (vertical)	Red maddox (horizontal)
Polarizing plate, 135°	Polarizing plate, 45°
Polarizing plate, 45°	Polarizing plate, 135°
Prism 10△BI	Prism 6△BU
Green filter	Red filter
Cross-hair reticle for PD	Cross-hair reticle for PD
Pinhole (1.2 mm dia.)	Pinhole (1.2 mm dia.)

Effective field angle Approx. :36°
Referencing wearing distance :12 mm or 13.75 mm

Distance between dust-proof glass in measuring window and corneal distance (referencing wearing distance) :8.5 mm (for 12 mm reference wearing distance)

Cheek rest		:Detachable (magnet type)
P. D. adjustment	Variable range	:50 mm to 80 mm in 0.5 (25 mm to 40 mm for one eye)
	Step	:0.5 mm (selectable from 0.1 mm, 0.5 m, and 1 mm)
Convergence		:Optical axis inclined at 400 mm in front of eye (mechanical type)
Longitudinal forehead rest adjustment		:15 mm or longer
Main unit tilt angle		:3° or greater on both left and right sides
Dimensions	(at PD of 64 mm)	:367 mm x 431 mm x 147 mm (height x width x depth)
Weight		:Approx. 8 kg

Remote Controller DCB00740 (without the display sheet)

Dimensions	:225 mm x 120 mm x 57 mm (height x width x depth)
Weight	:Approx. 470g (including AA Battery)
Power source	:AA Battery (3 pcs.)

Power Control Unit DCB00710 (printer built-in type)

Dimensions	:290 mm x 230 mm x 115 mm (width x depth x height)
Weight	:Approx. 6.4 kg
Rated voltage	:AC 100V/120V/230V Can be switched by using the voltage selector. Rated frequency 50/60 Hz
Rated current	:150 VA
Fuse	:T3.15A/250V (AC 100/120V area) T1.6A/250V (AC 230V area) Parts Number= DCB00710 #537 (3S464-014) 3.15A for 100/120V #538 (3S464-015) 1.6A for 230V
External interface	:RS-232C compatible interface (2pcs.)
Printer	:Thermal line dot printer Paper width: 60 mm Product number= DXA30171 (Common to NL-30P, NRK-8000, NR-5500)

3 Inspection

3－1 Shipping Inspection (Quick Inspection)

Main body

1) Check if there are any scratches or stains on the outside.
2) Check if the forehead rest moves smoothly.
3) Check if the unit horizontally adjusts smoothly.
4) Check if an error number appears when turning on power supply.
5) Check if the unit receives the signal from the remote controller.
6) Check if the PD and Convergence adjust smoothly.
7) Check if there is dust or stains on the lens.
8) ・Check if the lens power is initialized to "0" by pressing the [AC] key.
   ・Check if the degree of the cylindrical lens angle is correct.
   ・Check if the degree of the prism angle is correct.
9) Check if each lens plate moves (rotates) smoothly.
10) Check if the DIP SW settings are all OFF.

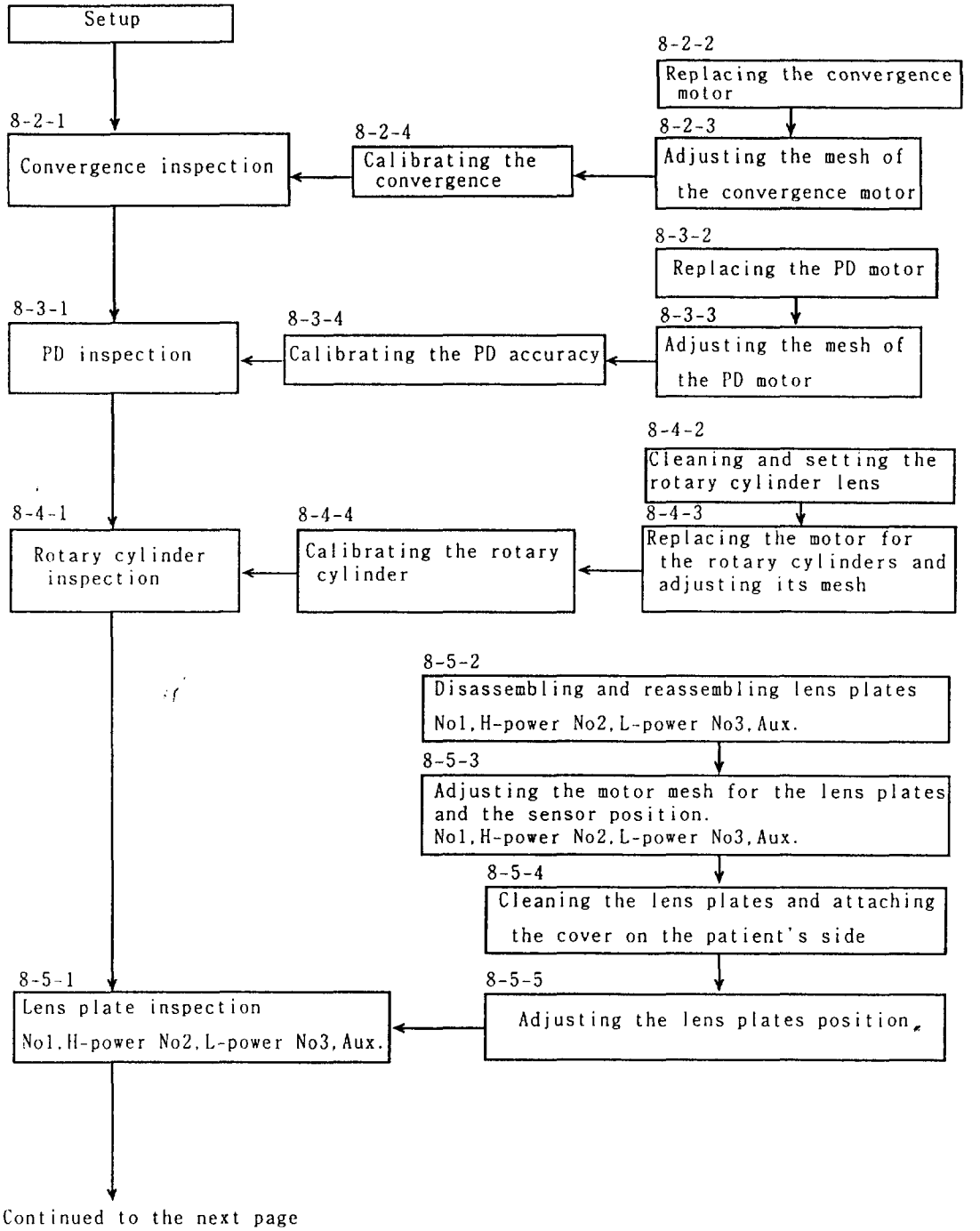
Power Control Unit

1) Check if there are any scratches or stains on the outside.
2) Check if the power switch works properly.
3) Check if the printer operates normally.
4) Check if the unit is adjusted to supply 16V for the driving power.

Remote Controller

1) Check if there are any scratches or stains on the outside.
2) Check if the jog dial rotates smoothly.

3－2 Inspection and Adjustment Procedure Flow chart



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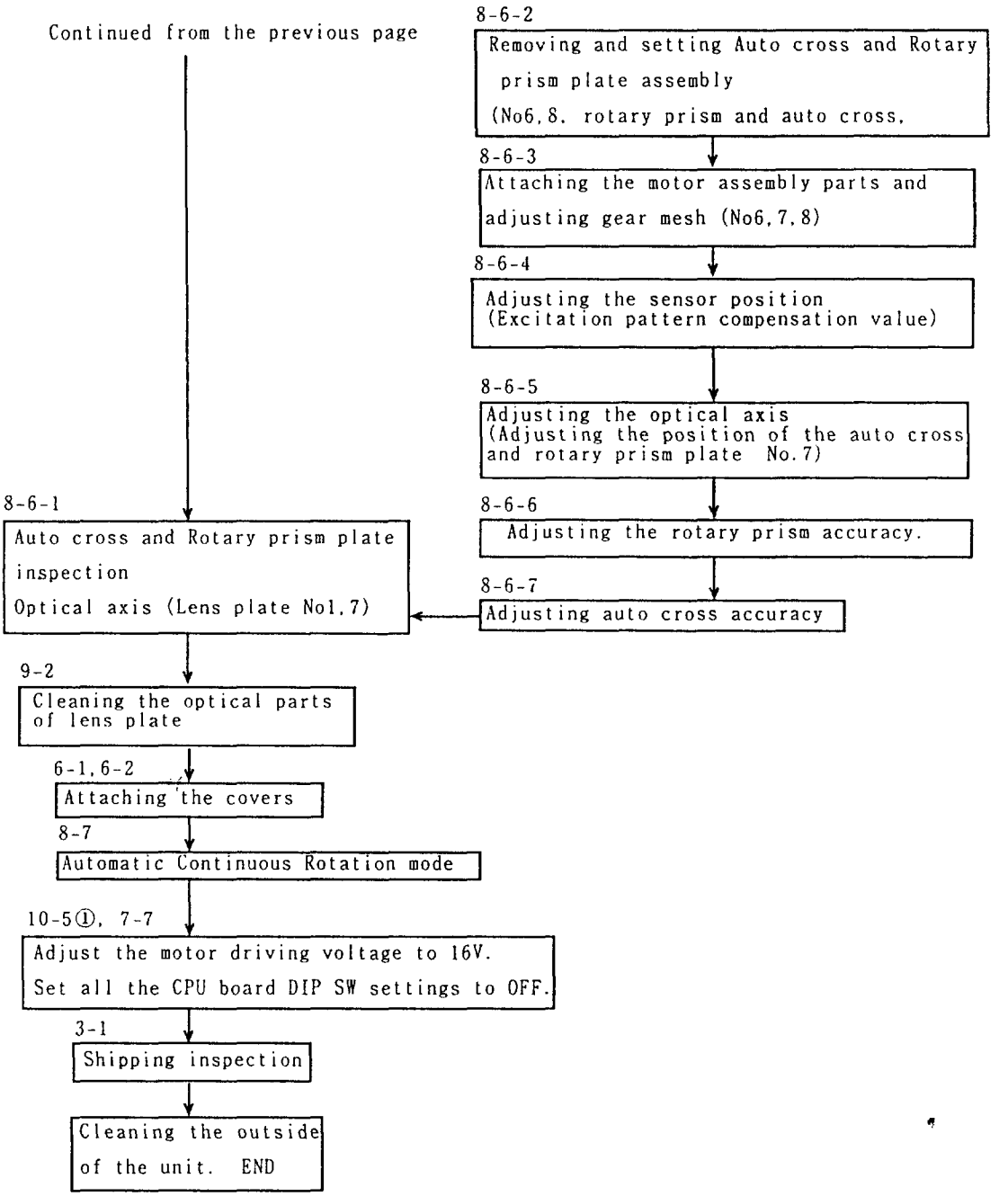
3-2 Inspection Adjustment Procedure Flowchart


Continued from the previous page
8-6-2
Removing and setting Auto cross and Rotary prism plate assembly
(No6,8. rotary prism and auto cross,
8-6-3
Attaching the motor assembly parts and adjusting gear mesh (No6,7,8)
8-6-4
Adjusting the sensor position
(Excitation pattern compensation value)
8-6-5
Adjusting the optical axis
(Adjusting the position of the auto cross and rotary prism plate No.7)
8-6-6
Adjusting the rotary prism accuracy.
8-6-7
Adjusting auto cross accuracy
8-6-1
Auto cross and Rotary prism plate inspection
Optical axis (Lens plate No1,7)
9-2
Cleaning the optical parts of lens plate
6-1,6-2
Attaching the covers
8-7
Automatic Continuous Rotation mode
10-5①, 7-7
Adjust the motor driving voltage to 16V.
Set all the CPU board DIP SW settings to OFF.
3-1
Shipping inspection
Cleaning the outside of the unit. END

3-2 Inspection Adjustment Procedure Flowchart

3－3 Inspection Reference List

Main body (Lens chamber)

Inspection name	Inspection conditions	limit of tolerances
P.D. precision	After initialization	ODP = less than ±0.03DP
Cyl. power precision	～±0.25D	Tolerance: less than ±5°
	±0.50D～±1D	Tolerance: less than ±3°
	±1.25D～	Tolerance: less than ±2°
Prism base direction precision		
	～ 1△	Tolerance: less than ±5°
	1.5△～10△	Tolerance: less than ±3°
	10.5△～20△	Tolerance: less than ±2°
Eccentricity	(Spherical and cylindrical power)	
	±0．25D～±6D	Tolerance: less than ±0.12△
	±6．12D～±12D	Tolerance: less than ±0.25△
	+12．1D～+16．8D	Tolerance: less than ±0.25△
	−12．1D～−19D	Tolerance: less than ±0.37△
	+17．0D～	Tolerance: less than ±0.50△
	−19．12D～	Tolerance: less than ±0.50△
Auto cross	Cylindrical power measurement	Tolerance: less than ±3°
Optical axis	Difference between lens plate No1(-15D) and No7(-10D)	-25D = less than 0.5△
Rotary prism		ODP = less than 0.25△
		5△BI = less than 0.25△
		5△BO = less than 0.25△
Power supply	Motor driving power 16V ± 0.1V (DC)	

4.Trouble-shooting

4－1 Troubleshooting

① The unit is not turned on, or does not start, or the LED is not lit at all.

Possible Cause: (1) The power cable is disconnected.
(2) The fuse has blown.
(3) The voltage selector is not properly set.
(4) The communication cable is defective or broken.
(5) The internal connector is disconnected.

② The LED is lit abnormally and beeps after initialization is completed.

Cause: The test program is running.
Measure: Set all the settings of the DIP SW on the CPU board to OFF.
Reference: The Repair Manual "7-7 DIP SW Table" (Figure 7-12)

③ An error Number is displayed.

Fix by referring the Repair Manual"4-2 Error numbers".

④ A lens plate is stuck and the vision in the measuring window looks crescent-shaped.

Measures: Adjust the gear mesh, or readjust the motor driving voltage(16V).
Reference: Section 8-5-3, 8-6-3, 10-5① in the Repair Manual.

⑤ After initialization, measured values for cylindrical power are still remained in the measuring window.

Possible Cause: (1) Gears(M4,5)are not meshed properly. (2)Cylindrical power was not adjusted correctly. (3) Motor driving voltage is not set to 16V properly.
Measure: Adjust gear mesh, readjust cylindrical power precision, or Motor driving voltage.
Reference: Section 8-4-3, 8-4-4, 10-5① in the Repair Manual.

⑥ The PD drive is not moved smoothly.

Possible Cause: (1) Mechanical parts are bent. (2) Gears are not meshed properly.
(3) Motor driving voltage is not set to 16V properly .
Measure: Replace parts, adjust gear mesh, or readjust Motor driving voltage.
Reference: Section 8-3-3, 10-5① in the Repair Manual.

⑦ Convergence part is not moved smoothly.

Possible Cause: (1) Gears are not properly meshed. (2) Mechanical parts are bent.
(3) Motor driving voltage is not set to 16V properly.
Measure: Replace parts, adjust gear mesh, or readjust Motor driving voltage.
Reference: Section 8-2-3, 10-5① in the Repair Manual.

⑧ After initialization, the RV does not start by pressing the remote controller key or dialing the jog dial.

Cause: (1)The setting for the remote controller's ID does not match the DIP SW setting of the controller.
(2)The main unit cannot receive the correct signal from the remote controller due to the noise from a fluorescent light.
(3)The batteries in the controller are run down.
Measure: (1)Change the "Setting for remote controller signal reception" option on the "Communication Setup"menu.
(2)Move the unit away from a fluorescent light and update the ROM of SUB-CPU (U35) to V1.20.
Reference: instruction manual P37 Repair manual Section 12-2

⑨ The RV can be operated with the remote controller but the chart projector cannot.

Cause: (1) The setting for the chart ID does not match the NP-3S DIP SW settings of the controller.
(2) The main unit cannot receive the correct signal from the remote controller.

Measure: (1) Change the "Setting for chart signal transmission" option on the "Communication Setup" menu.
(2) Try communication by wire using the RV/NP-3S communication cable (DCB00771).

Reference: See page 35 in the Instructions and "12-2 Initial Settings Table" and section 12-5 NP-3S DIP SW (No.1, 2) in the Repair manual.

⑩ The chart projector can be operated but it does not display the specified chart.

Cause: (1)The initial settings are not set properly.
(2)The chart does not match the remote controller type.

Measure: (1) Change the "Chart Model" option on the "Communication Setup" menu.
(2) Use the specified type of the remote controller.

Reference: See page 34 in the Instructions, and "12-2 Initial Settings Table" Communication set (1) and section 12-5 NP-3S DIP SW (No.5, 6, 7) in the Repair manual.

⑪ The auto refractometer and auto lensmeter do not communicate with RV.

Cause: The initial settings are not set properly or the cable is broken.

Measure: Make sure that the initial settings for each device are set properly and make the necessary changes if they are not.

Reference: See page 35 and 36 in the Instructions, and "12-4 Recommended setting for interface" in the Repair manual.

⑫ The printer does not print out.

Cause-1: The initial settings are not set properly.

Measure: Change the initial settings by changing the "Selecting Printer" option on the "Communication Setup".

Reference: See page 35 in the Instructions and "12-2 Initial Setting Table" Communication set (2) in the Repair manual.

Cause-2: Printer paper is set inside out.

Measure: Reset it properly.

Reference: Page 40,41 in the Instructions.

Cause-3: Printer paper is not inserted into the paper inlet.

Measure: Insert it into the paper inlet properly.

Reference: Page 40,41 in the Instructions.

Cause-4: The paper release lever on the printer is not set at the normal position.

Measure: Set it at the proper position.

Reference: Page 41(Fig.21) in the Instructions.

⑬ There is dust on the glass.

Clean it by referring "9 Cleaning Optical Parts" in this Repair manual.

4－2 Error Numbers

Error number: 001-010 (the last two digits in the number indicate the motor number.)
Error name: Right lens chamber initialization error
(For details, see Table 4-1 and Figure 7-3 and 7-4.)

Error number: 101-110 (the last two digits in the number indicate the motor number.)
Error name: Left lens chamber initialization error
(For details, see Table 4-2 and Figure 7-3 and 7-4.)

Error number	Motor number	Sensor	Usage
001	RM1	RS1	Right:Lens plate for high-power spherical lenses
002	RM2	RS2	Right:Lens plate for low-power spherical lenses
003	RM3	RS3	Right:Auxiliary lenses plate
004	RM4	RS4	Right:Rotary cylinder (Cyl. -3.5D)
005	RM5	RS5	Right:Rotary cylinder (Cyl. +3.5D)
006	RM6	RS6	Right:Rotary prism
007	RM7	RS7	Right:Rrotary prism and Auto cross lens plate
008	RM8	RS8	Right:Rotary prism, auto cross
009	RM9	RS9	Right:PD
010	RM10	RS10	Right:Convergence

Table 4-1

Error number	Motor number	Sensor	Usage
101	LM1	LS1	Left:Lens plate for high-power spherical lenses
102	LM2	LS2	Left:Lens plate for low-power spherical lenses
103	LM3	LS3	Left:Auxiliary lenses plate
104	LM4	LS4	Left:Rotary cylinder (Cyl. -3.5D)
105	LM5	LS5	Left:Rotary cylinder (Cyl. +3.5D)
106	LM6	LS6	Left:Rotary prism
107	LM7	LS7	Left:Rrotary prism and Auto cross lens plate
108	LM8	LS8	Left:Rotary prism, auto cross
109	LM9	LS9	Left:PD
110	LM10	LS10	Left:Convergence

Table 4-2

Cause: When turn the unit on, sensor did not respond in the specific time.
The cause may be that the sensor or motor in the lens chamber malfunctioned, a cord is broken or pinched, gears are not meshed properly, motor driving voltage is not supplied at the specified voltage, or mechanical parts are bent.

Measure: Check the operation of the sensor or motor with error number. check the cable continuity, or adjust the gear mesh.

Inspection procedure:
Execute test program 2(LM) to move the motor which caused an error (Set DIP SW No1 & 8 to ON).

→ If it works normally, it means that nothing is wrong with the motor or other mechanical parts. The cause of the error may be a broken sensor cord, disconnected sensor connector, broken sensor, or maladjustment of compensation values.

→ If it does not work, the cause of the error may be that gears are not meshed properly (meshed tight), the motor cable is broken, the motor connector is disconnected, or the motor driving voltage is not enough. (see 10-5① Adjust the voltage to 16V.)

Error number: 201-211 (the last two digits in the number indicate the compensation value No.)
Error name: Right lens chamber compensation value error
Cause: A compensation is out of range (see Table 4-3 for reference).
Measure: Readjust the compensation value, or replace EEPROM (U5).

Error number: 301-311 (the last two digits in the number indicate the compensation value No.)
Error name: Left lens chamber compensation value error
Cause: A compensation is out of range (see Table 4-3 for reference).
Measure: Readjust the compensation value, or replace EEPROM (U5).

Compensation value range

Motor number	Maximum	Minimum
1	576	0
2	576	0
3	576	0
4	360	0
5	360	0
6	360	0
7	576	0
8	360	0
9	576	0
10	300	−300
11	360	0

Table 4-3

Error number: 400
Error name: RV Initial setting error
Cause: Initial settings are set abnormally, or EEPROM (U5) is defective.
Measure: Set the initial settings (SET) or replace EEPROM (U5).

Error number: 401
Error name: Initial setting error of interface
Cause: Initial settings are set abnormally, or EEPROM (U5) is defective.
Measure: Set the initial settings (Communication setup ↑ ↓) or replace EEPROM (U5).

Error number: 402
Error name: Examination Programs error
Cause: Examination Programs are not set properly, or EEPROM (U5) is defective.
Measure: Reset the program. or replace EEPROM (U5).

Error number: 403
Error name: Initial setting error of timer
Cause: Initial settings are not set, or EEPROM (U5) is defective.
Measure: Set the initial settings (Set time) or replace EEPROM (U5).

Error number: 404
Error name: Timer error
Cause: Backup batteries are run down, or the RTC-72423 (U9) on the CPU board is defective.
Measure: Replace the batteries or the RTC-72423 (U9) on the CPU board.
Remarks: When an error occurs, the clock is automatically set to 96-12.12 12:12am.

Error number: 405
Error name: Buffer error (only in the 8 data mode)
Cause: Backup batteries are run down, or RAM (U4) on the CPU board is defective.
Measure: Replace the batteries or RAM (U4) on the CPU board.
Remarks: When an error occurs, all stored data of auto refractometer is cleared.

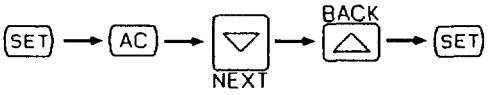
5 Test Programs

5－1 Starting test programs

(1) Procedure of Starting test programs

Test programs are started in the following three ways(A,B,C), depending on the repairing process. When you launch a test program, TEST-1 (pulse mode) is automatically started. While the test program is running, a beep keeps sounding from the internal speaker.

(A) Turn the unit on and wait for a while until the initialization process completes. Press the remote controller keys as follows:



(Note)

- If you press a wrong key, test programs do not start. So turn off the power switch, then turn it on again and enter the password.
- If you wish to adjust the compensation values after you start a test program, you need to set the DIP SW 1- No.1 on the CPU board to ON.

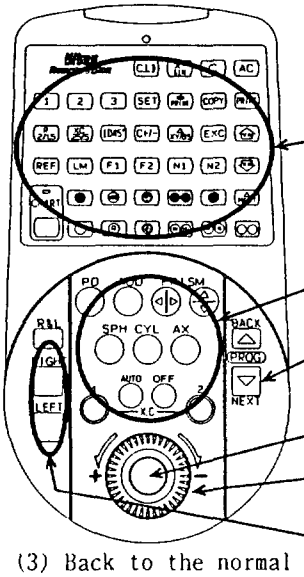
(B) Set the DIP SW .1- No.1 to ON, then turn on the power switch. You can start a test program without pressing the remote controller keys, and adjust the compensation values.

(C) When you set the DIP SW .1- No.1 and No8 to ON and turn on the power switch, a test program starts, skipping the motor initialization process.
Use this method when you want to start a test program with the motors and sensors removed.

(2)Basic Operation

① Description: You can select which program to start and execute it by the remote controller. Key actions are described below.

② Operation keys list



Operation keys: Selects and executes a test program.
Reference: 5-2 Table of Test Programs
Reference: 5-3 Description of Test Program

Motor selector keys: Selects the motor according to Table 5-1.

Confirmation mode: Initializes the program with the current compensation values in RAM, enabling normal operation temporarily.

Step selector switch: Changes the step between 1 and 10 pulses.

Jog dial: Increases or decreases the compensation values of the specified motor.

Lens chamber selector switch: Selects right or left lens chamber.

(3) Back to the normal mode

Set all CPU-DIP SW settings to OFF, and turn off the power switch. When you turn on the power again, the initialization process is launched with the compensation values in EEPROM, and the normal measuring mode starts.

4) Configuration

Table 5-1 lists the motor number and its application for each remote controller key:

Remote controller key	Motor No.	Application
PD	1	Lens plate for high-power spherical lenses
ADD	2	Lens plate for low-power spherical lenses
Horizontal prism ◁▷	3	Auxiliary lenses plate
Vertical prism △▽	4	Rotary cylinder (Cyl. -3.5D)
SPH	5	Rotary cylinder (Cyl. + 3.5D)
CYL	6	Rotary prism
AX	7	Rrotary prism and Auto cross lens plate
XC1	8	Rotary prism, (auto cross)
AUTO XC	9	PD
OFF	10	Convergence
XC2	11	Auto cross

Table 5-1

* Motor No.8 and 11 use the same motor and sensor, but they are listed separately to be specified with different compensation values.

5－2 Table of Test Programs

Test program -1	Key (REF)	Mode: Pulse mode Appli.:Adjusting compensation values
Test program -2	Key (LM)	Mode: Lens plate rotation mode Appli.:Checking gear mesh
Test program -3	Key (F1)	Mode: Lens Frame mode Appli.:Cleaning lenses,checking motor
Test program -4	Key (F2)	Mode: Write mode Appli.:Writing or clearing com. values
Test program -5	Key (N1)	Mode: Initialization mode Appli.:Initializing motors
Test program -6	Key (PRINT)	Mode: Compensation value print mode Appli.:Confirming the compensation values
Test program -7	Key (N2)	Mode: Automatic Continuous Rotation mode Appli.:Checking gear mesh
Test program -8	Key BACK △	Mode: Factory set mode :Not required during normal maintenance

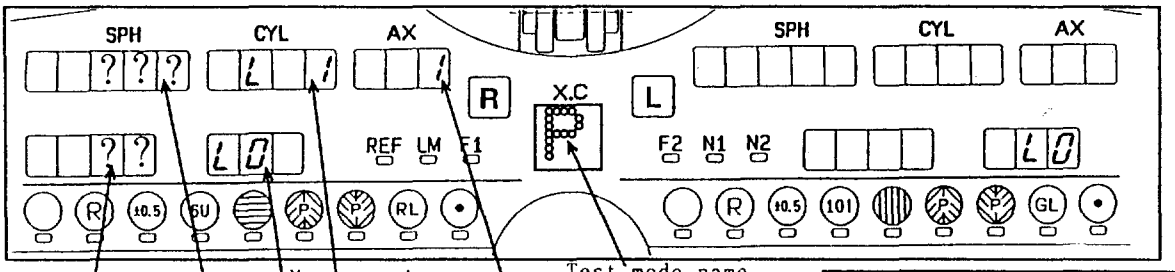
Table 5-2

5-3 Test Program Description

TEST PROGRAM-1 key (REF)

Pulse mode

Adjusting compensation values



Voltage values for sensor

Compensation value

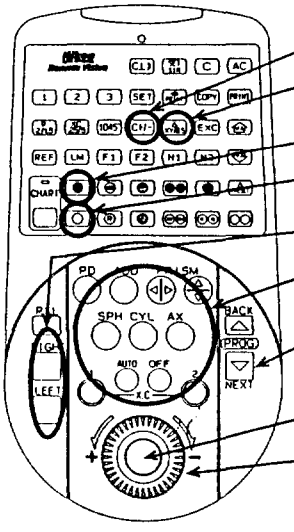
Sensor level

Motor number

Selected step

Test mode name

Right lens chamber selection screen



TEST-1-submenu 1: Cylindrical power adjusting mode. See P18.

TEST-1-submenu 2: Prism adjusting mode. See P18.

LED On check: Turns on all LED and returns to pulse mode in 5sec.

LED Off check: Turns off all LED and returns to pulse mode in 2sec.

Lens chamber selector key: Selects the R or L lens chamber.

Motor selector key: Selects the motor according to Table 5-1.

Confirmation mode: Initializes the program with the current compensation values in RAM, enabling normal operation temporarily.

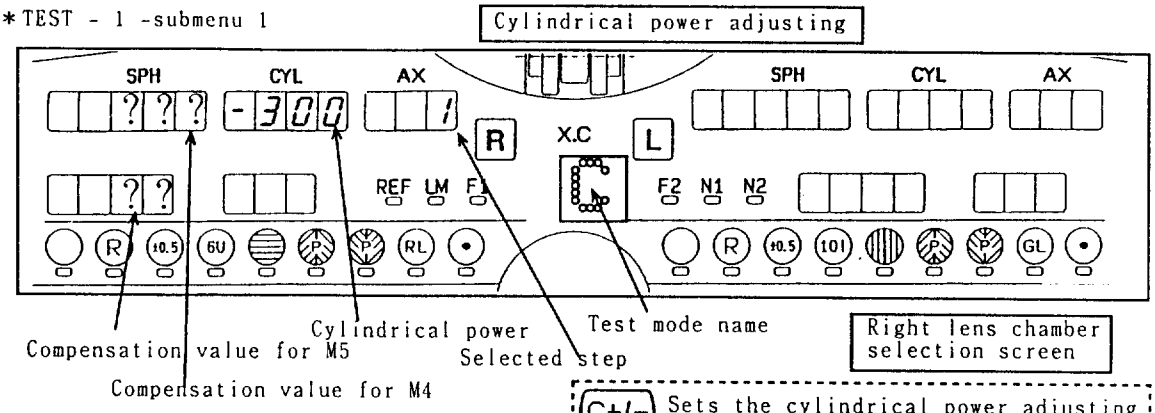
Step selector switch: Changes the step between 1 and 10 pulses.

Jog dial: Increases or decreases the compensation values of the specified motor.

(SET) : If you press this key twice, the specified compensation value is written on EEPROM (with the CPU DIP SW1- No.1 to ON).

Remarks: Test programs execute with pulse mode first.

*TEST - 1 -submenu 1

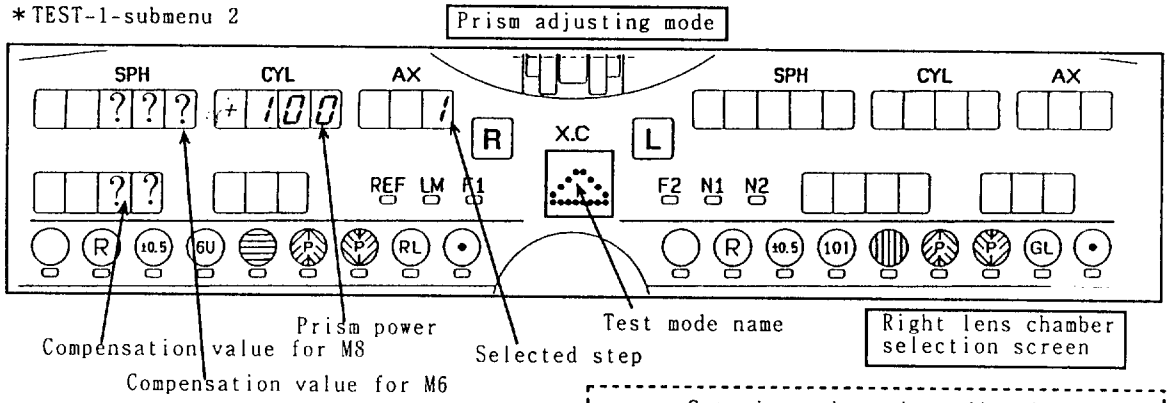


C+/- Sets the cylindrical power adjusting mode with C-3D, AX 90°. Pressing this key rotates the cylindrical power lens motor, M4 and M5 in turn, 180°

VA↑ Pressing the VA-UP key sets +3D.

VA↓ Pressing the VA-DOWN key sets -3D.

*TEST-1-submenu 2



XY/BS Sets into the prism adjusting mode with 1△BASE IN.

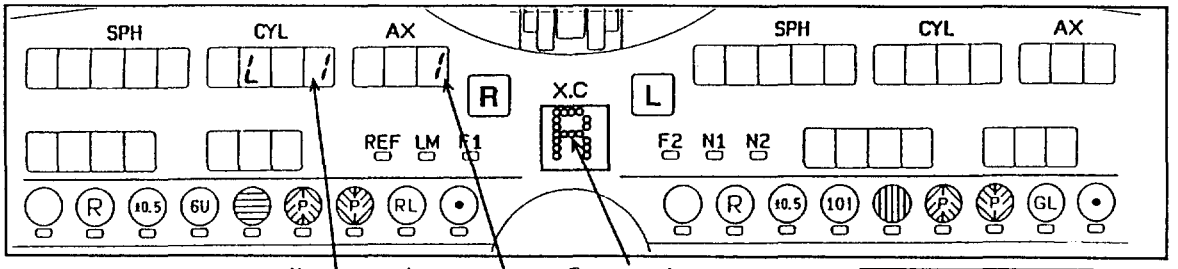
VA↑ Pressing VA-UP key sets 1△BASE IN.

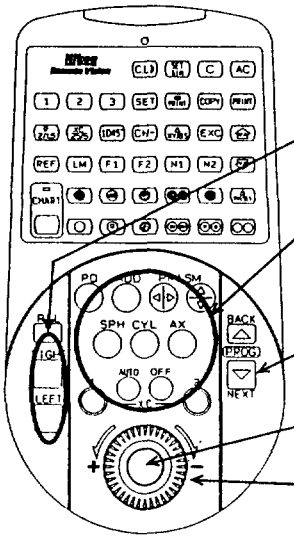
VA↓ Pressing VA-DOWN key sets 1△BASE OUT.

Test Program-2 Key (LM)

Lens Plate rotation mode

Checking gear mesh and movements





Lens chamber selector switch: Selects R or L lens chamber.

Motor selector key: Selects the motor according to Table 5-1.

Confirmation mode: Initializes the program with the current compensation values in RAM, enabling normal operation temporarily.

Step selector switch: Changes the revolution between 1 and 10 revolutions.

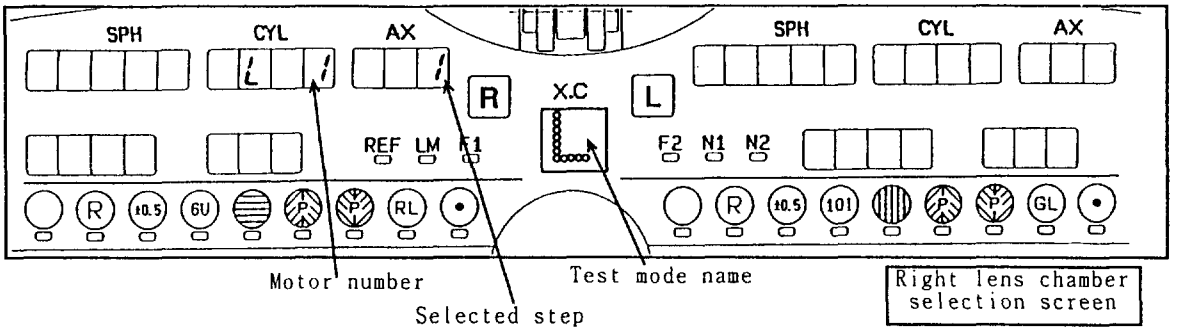
Jog dial: Rotates the specified motor.

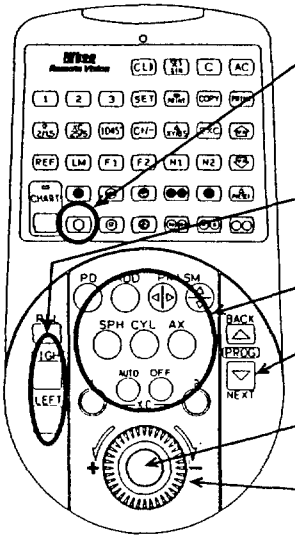
5-3 Test Program-2 Lens plate rotation mode

Test Program-3 Key (F1)

Lens Frame mode

Cleaning lenses, or checking motor





Lens moving for cleaning:
Moves the lens on the lens plate in the measuring window to the cleaning window, pressing this again moves it back to the measuring window(See sec. 9-2).

Lens chamber selector switch: Selects R or L lens chamber.

Motor selector key: Selects the motor according to Table 5-1.

Confirmation mode: Initializes the program with the current compensation values in RAM, enabling normal operation temporarily.

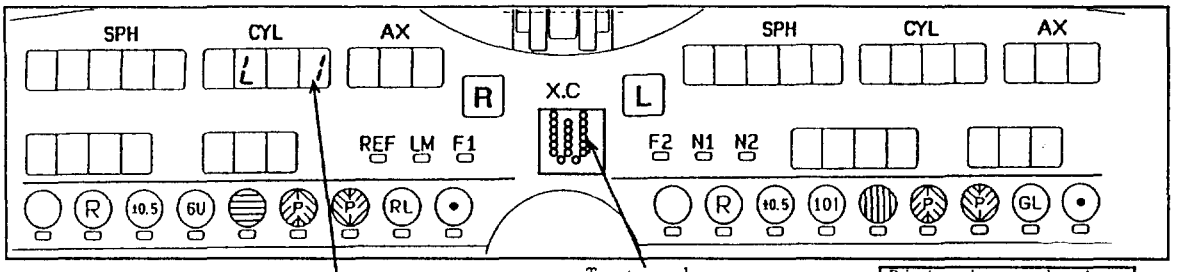
Step selector switch: Changes the step between 1 lens Frame and 1 revolutions.

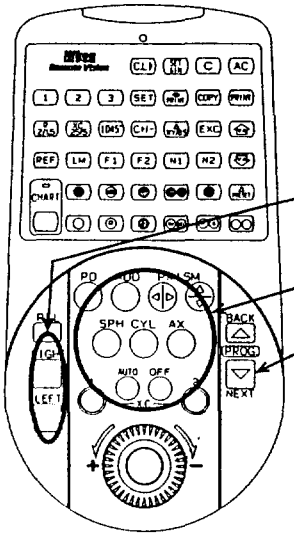
Jog dial: Rotates the specified motor.

Test Program-4 Key (F2)

Write mode

Writing or clearing com. values.





Lens chamber selector switch: Selects R or L lens chamber.

Motor selector key: Selects the motor according to Table 5-1.

Confirmation mode: Initializes the program with the current compensation values in RAM, enabling normal operation temporarily.

(SET) Writing one compensation value:
Writes one compensation value in the RAM of the selected motor onto EEPROM.

(COPY) Writing all compensation values:
Writes all the compensation values in the RAM of R or L onto EEPROM. This process can not be performed for R and L at the same time.

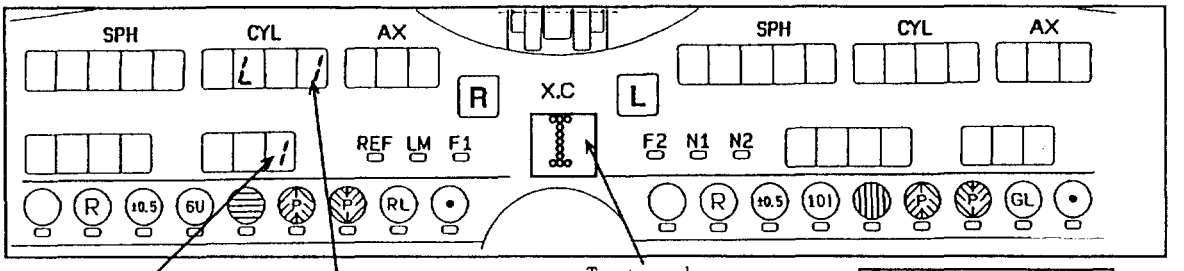
(C) Clearing one compensation value:
Clears one compensation value in the RAM of selected motor to "0". No values are written onto EEPROM.

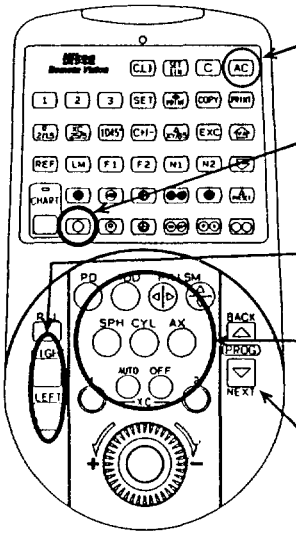
(AC) Clearing all compensation values:
Clears all the compensation values in the RAM of R or L to "0". No values are written onto EEPROM.

Test Program-5 Key (N1)

Initialization mode

Initializing motors





Excitation pattern compensation value check key:
Checks the stability of compensation values.

All Initializing key:
Initializes all the motors of right or left, or both lens chambers by selecting with Lens chamber selector switch.

Lens chamber selector switch:
Selects R or L lens chamber.

Initializing key:
Selects and initializes the motor according to Table 5-1.

Confirmation mode:
Initializes the program with the current compensation values in RAM, enabling normal operation temporarily.

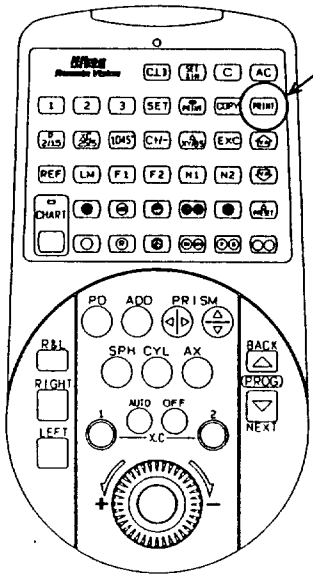
(Note) Excitation pattern compensation value:

A sensor compensation value to stabilize the pulse motor. It is displayed when the motor number 4,5,6,7,8 is selected. It is supported by ROM Ver 1.20 or later.

Test Program-6 Key (PRINT)

Compensation value print mode

Confirming the compensation values



Print key:
Press this key while a test program is running, compensation values are printed.

Sample Printout

```
 7. 5.'97 17:15

 MAIN:Ver 1.20
 SUB :Ver 1.20
 TYPE:Export
 === Test Data ===
 -------
  Right
 -------
 No. 1 +0569(0239H)
 No. 2 +0569(0239H)
 No. 3 +0567(0237H)
 No. 4 +0004(0004H)*1
 No. 5 +0006(0006H)*2
 No. 6 +0217(00D9H)*3
 No. 7 +0568(0238H)*1
 No. 8 +0299(012BH)*1
 No. 9 +0259(0103H)
 No.10 -0004(FFFCH)
 No.11 +0358(0166H)
 -------
  Left
 -------
 No. 1 +0567(0237H)
 No. 2 +0568(0238H)
 No. 3 +0570(023AH)
 No. 4 +0054(0036H)*2
 No. 5 +0065(0041H)*2
 No. 6 +0309(0135H)*0
 No. 7 +0566(0236H)*2
 No. 8 +0359(0167H)*3
 No. 9 +0229(00E5H)
 No.10 -0014(FFF2H)
 No.11 +0338(0152H)
```

ROM version number

Right motor number

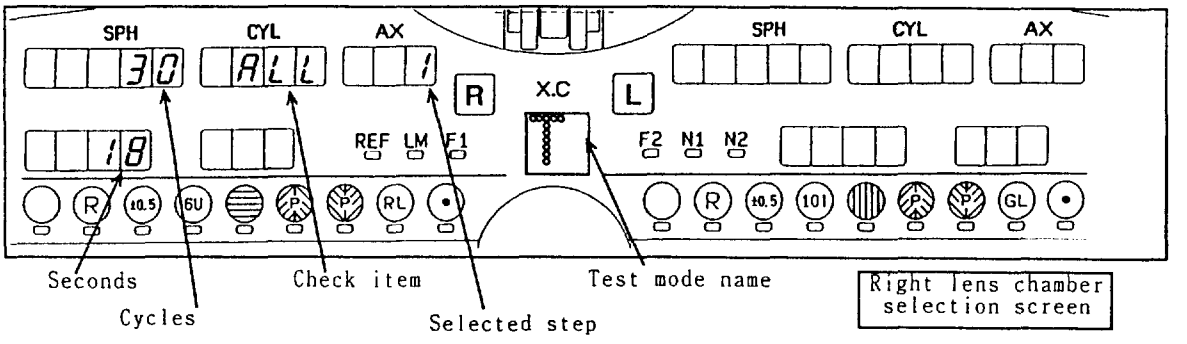
Right compensation value

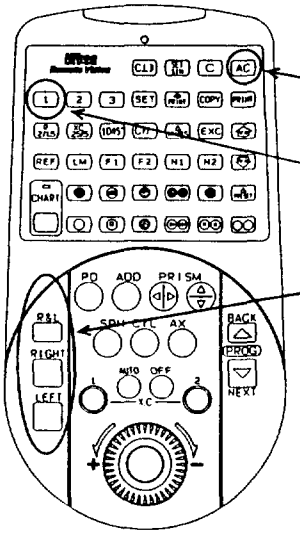
Right Excitation pattern compensation value:
Supported by ROM Ver 1.20 or later. See the previous page for more.

Test Program-7 Key (N2)

Automatic Continuous Rotation mode

Checking gear mesh





Test cancel key:
Aborts the test during the test cycle.

Test start key:
Starts a 30-minute Automatic Continuous Rotation test.

Lens chamber selector switch:
Selects Right or Left lens chamber.

Remarks

Automatic Continuous Rotation test repeats 30 test cycles, in which motors run 10 seconds and rest 50 seconds per cycle, for 30 minutes. When the test completes, the test program is set in the standby mode.

Caution 1:

Do not perform the Automatic Continuous Rotation test twice in succession. Motors could be overheated.

Caution 2:

You need to set the DIP SW1 - No.2 to ON to run this test program.

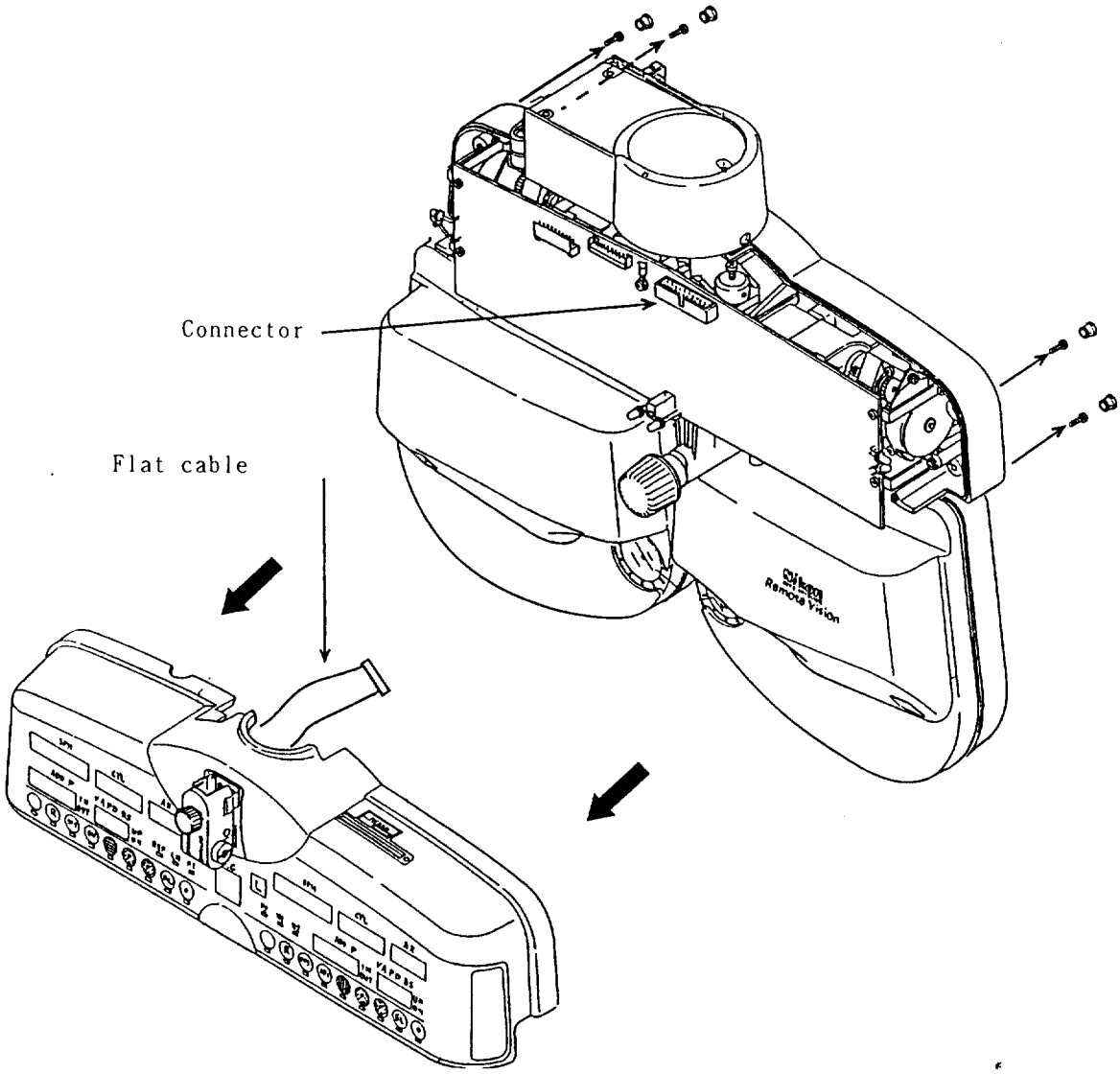
6. Removing the Main body Cover

6－1 Removing the LED display cover

①Remove the four screw covers and unscrew the screws. (See fig. 6-1)

②Remove the LED display cover.

③Disconnect the flat cable from the connector.

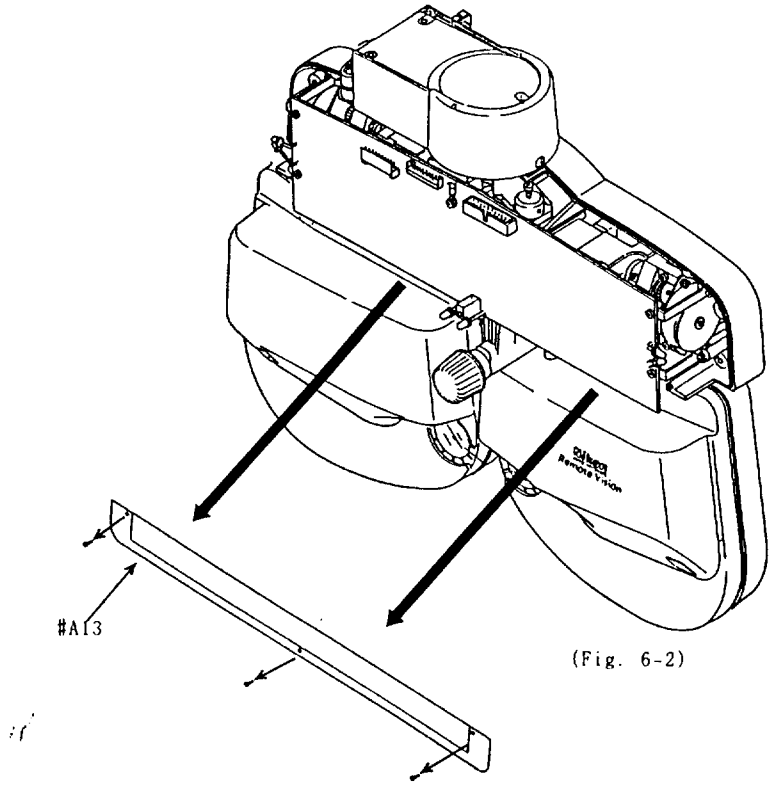


(Fig. 6-1)

6-1 Removing the LED display cover

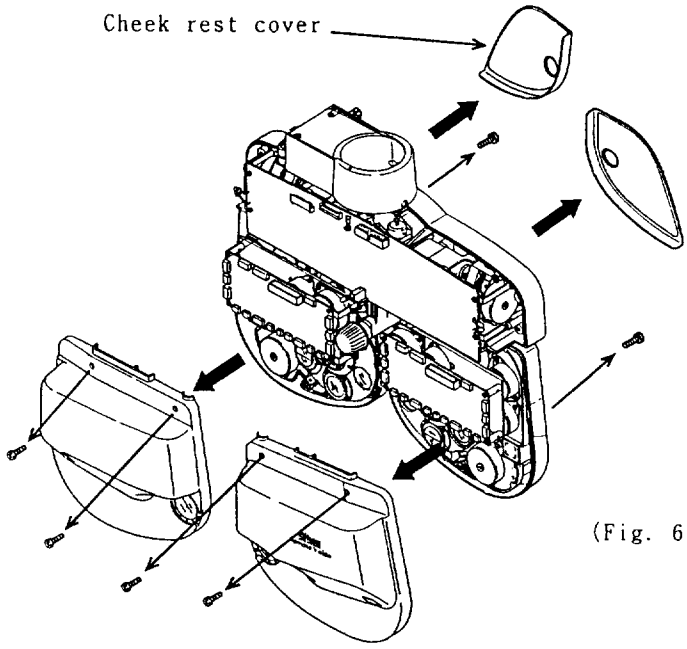
6－2 Removing Right and Left Lens Chamber Covers, and Lens Chamber

① Remove the LED display cover referencing "6-1 How to remove the LED display cover ".
② Unscrew the plate screws and remove the plate (#A13).



(Fig. 6-2)

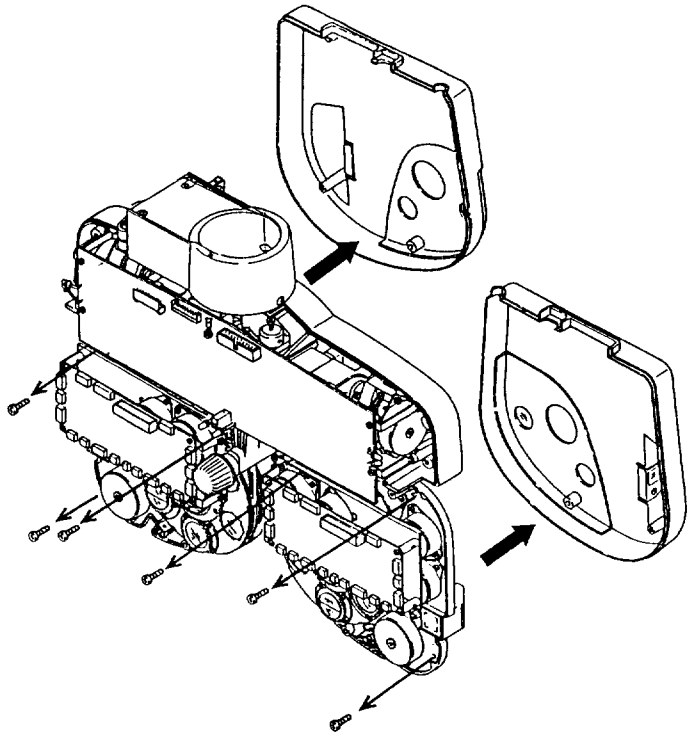
③ Remove the cheek rest cover. Unscrew the patient's side screws.
④ Unscrewing the examiner's side screws enables the removal of the examiner's side cover.



(Fig. 6-3)

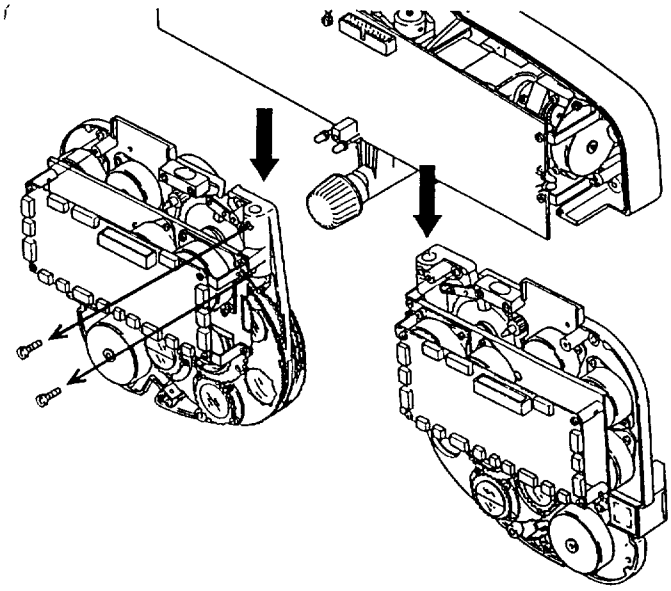
6-2 Removing R&L Lens Chamber and covers

⑤ Unscrew the screws from inside the lens chamber to remove the patient's side cover.



(Fig. 6-4)

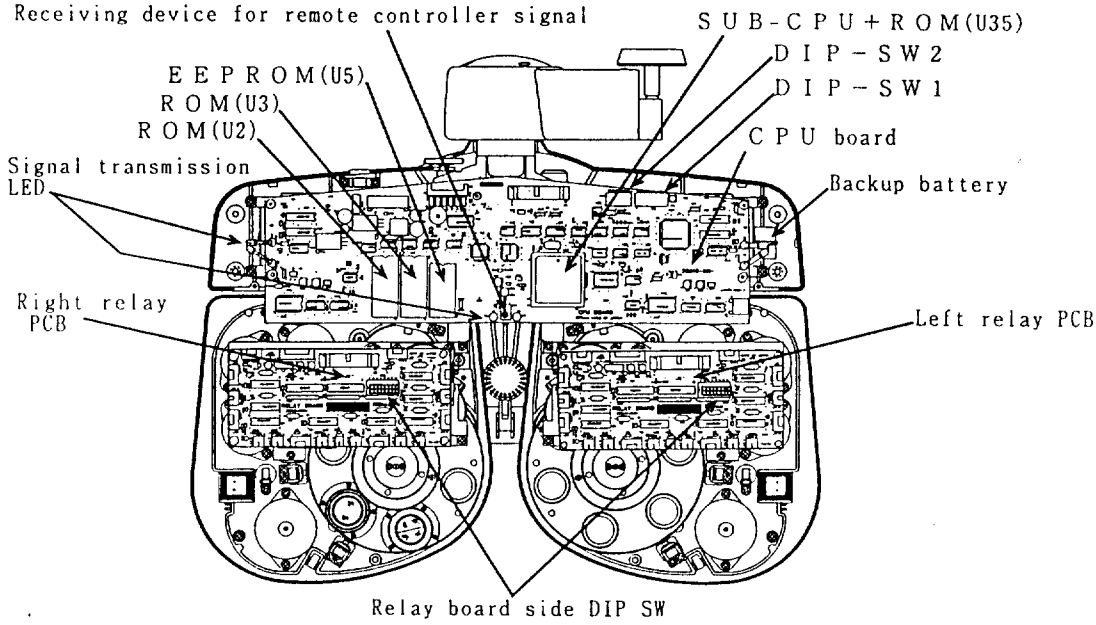
⑥ Disconnect the connectors and ground cables connecting the lens chamber with the CPU board.
⑦ Unscrewing the screws enables the removal of the lens chamber (see Figure 6-5).



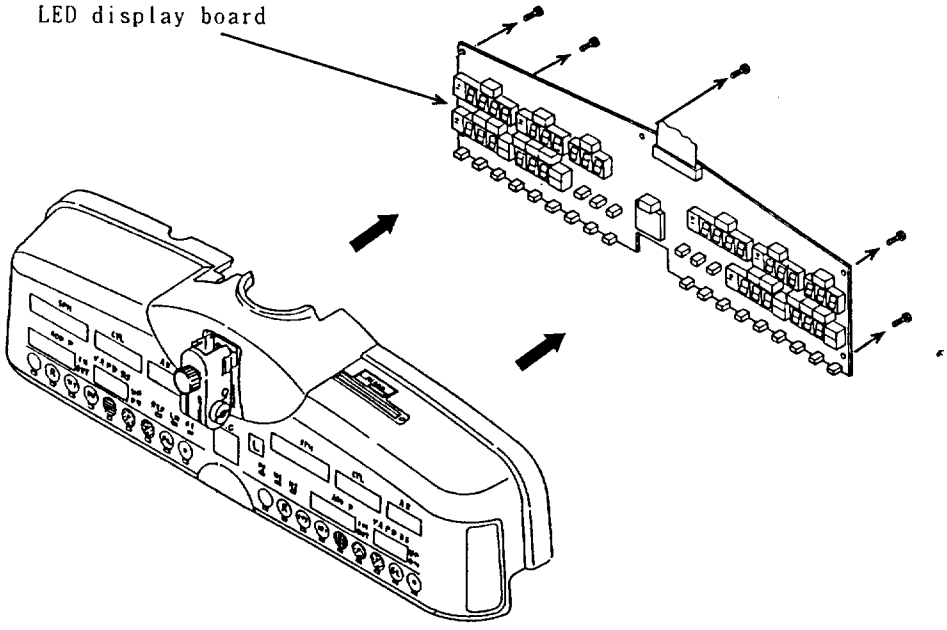
(Fig. 6-5)

7.Replacing the Electrical Boards

7－1 Board and Electrical Component Locations



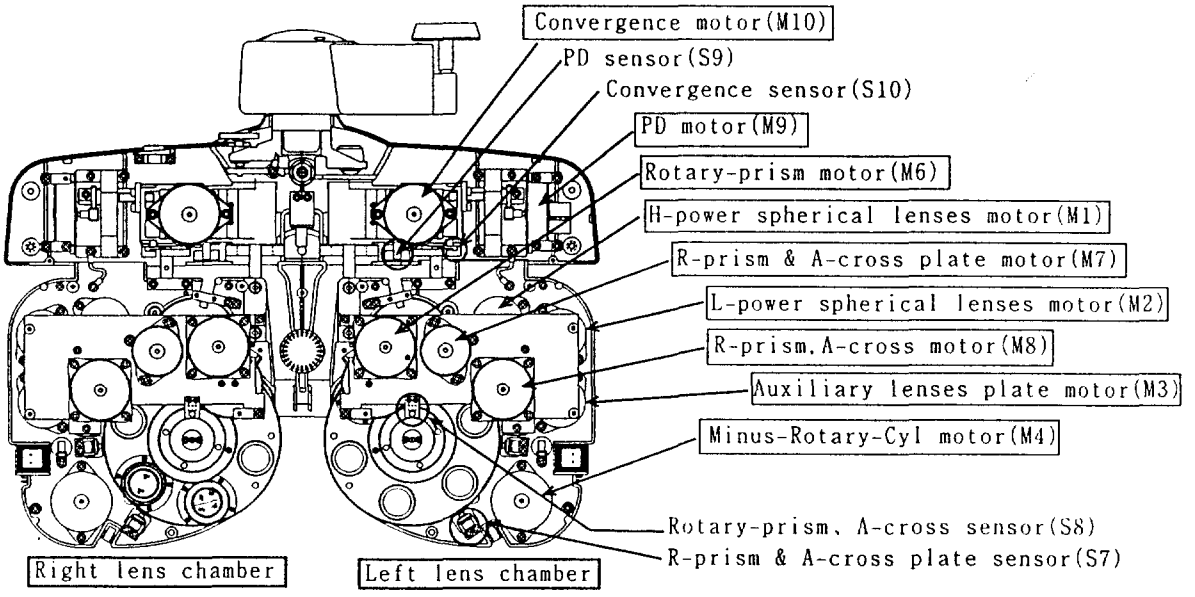
(Fig. 7-1)



(Fig. 7-2)

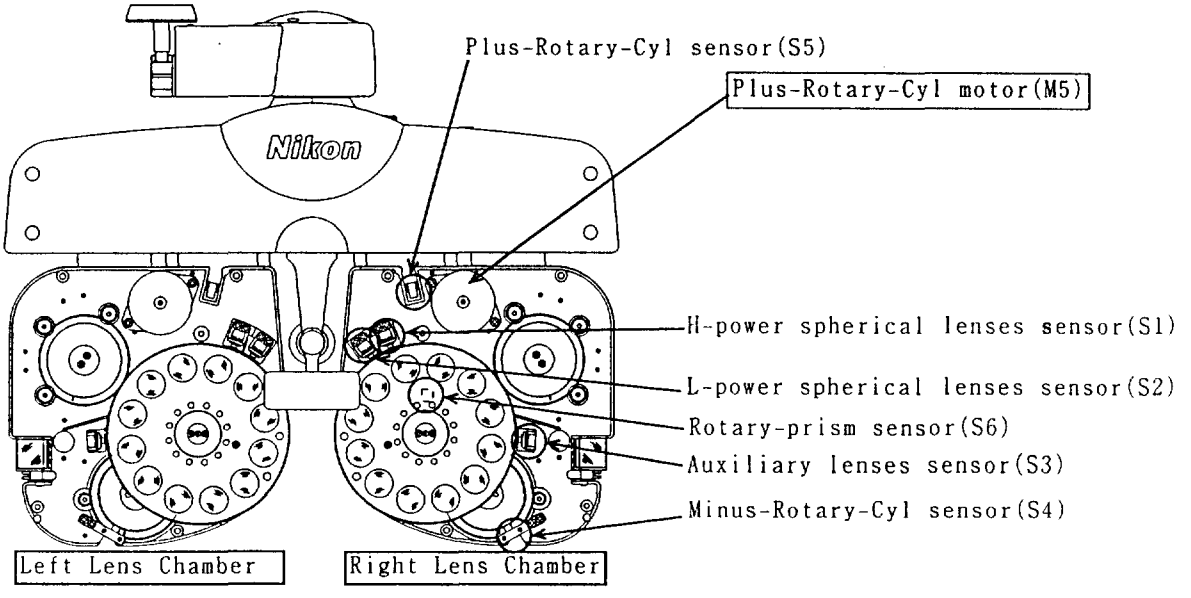
Arrangement of Motors and Sensors

Inside view of examiner's side lens chamber



(Fig7-3)

Inside view of patient's side lens chamber

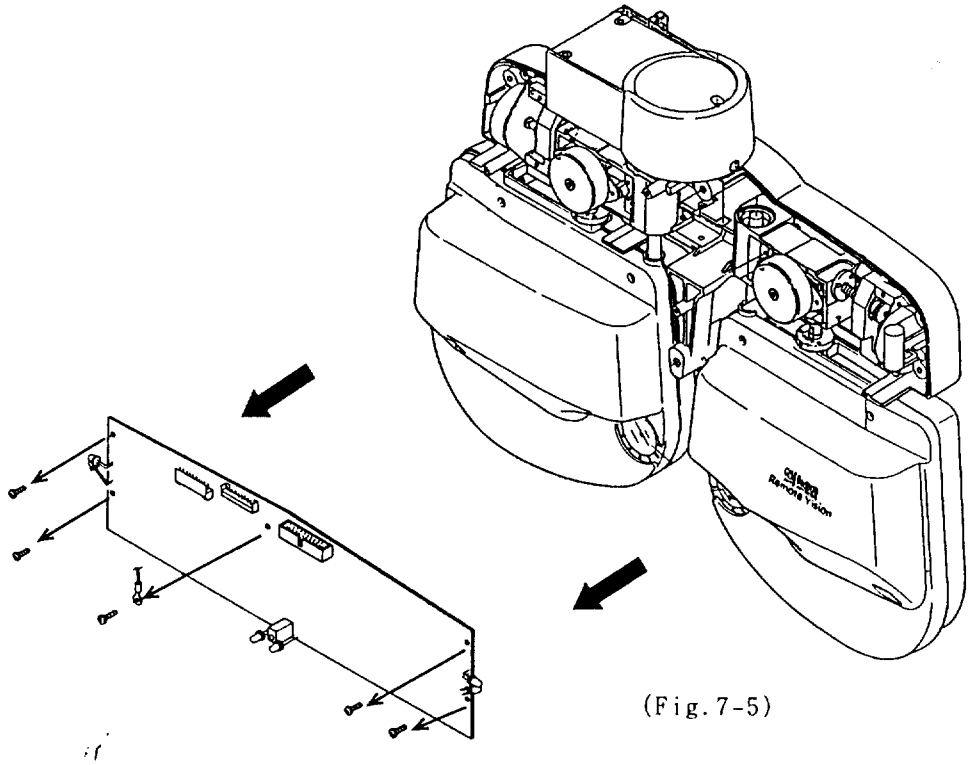


Note: Rotary-prism sensor (S6) is hidden behind the lens plates.

(Fig.7-4)

7－2　Replacing the CPU Board

① Remove the LED display cover (see 6-1 for details).
② Remove the mounting screws (#406 X 4 and #407 X 1) from the board and disconnect all connectors.
③ Remove the CPU board.



(Fig.7-5)

④ Replace a new CPU board and connect all connectors.
⑤ Replace the screws (#406 X 4 and #407 X 1) to install the board.
⑥ Remove the ROM (U2 and U3), SUB-CPU(U35), and EEPROM (U5) from the old board and then install them on the new board (see Figure 7-1).

Caution (1): Use special tool to replace the SUB-CPU (U35). Otherwise, the socket may be damaged. See Figure 8-3.

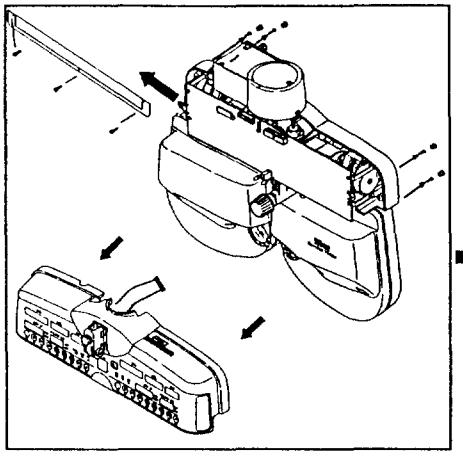
Caution (2): Set all DIP SW settings on the CPU board to "OFF". Adjust the VR-1 of the speaker to the middle.

Caution (3): You have to remove the backup batteries to replace the CPU board, so you need to reset the clock function (date and time).

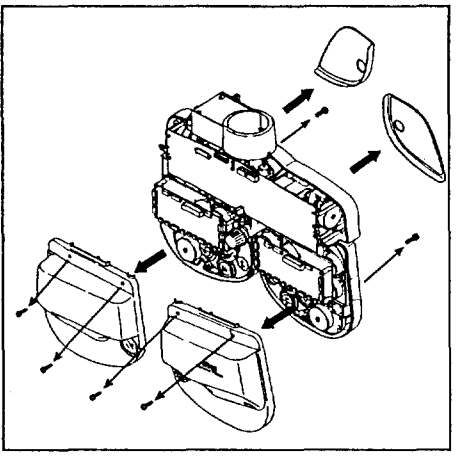
⑦ Attach the cover in the reverse order of disassembly and perform the Quick Inspection explained in Scetion 3-1.
If nothing wrong is detected in the inspection, the replacing procedure is complete.

7－3　Replacing Right or Left Relay Board

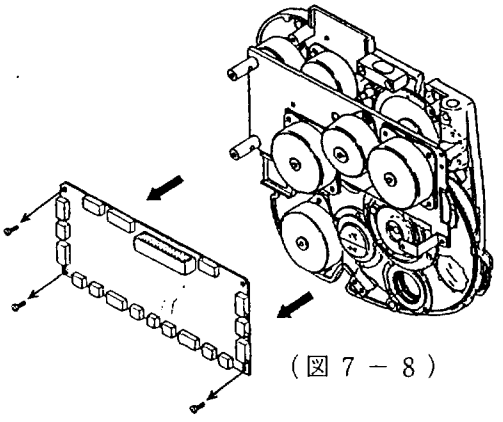
① Remove the examiner's side and LED display covers, referencing 6-1 & 6-2(Fig. 7-6,7-7).



(Fig. 7-6)



(Fig. 7-7)



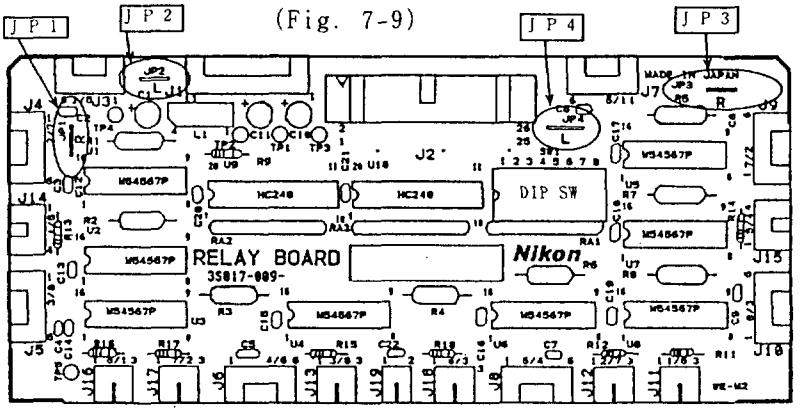
(図 7 － 8)

② Disconnect all connectors from the board.
③ Remove the mounting screws (#406 X 3) and extract the board (see Figure 7-8).
④ Install the new relay board and connect all connectors (set the jumper wires to indicate the direction of the board). See fig 7-9
⑤ The DIP SW settings depends on the direction of the board. Set the DIP SW settings of the new board to the same as the old board.
⑥ Assemble the board by following the procedure for disassembly in reverse and attach the cover. If nothing wrong is detected in the inspection described in "3-1 Summary inspection", the replacing procedure is complete.

Caution 1: The right and left relay boards have the same parts on them, but they are specified as right or left by cutting certain jumper wires (Figure 7-9).
Make sure that you cut the jumper wires, otherwise the PCB or motors may overheat.

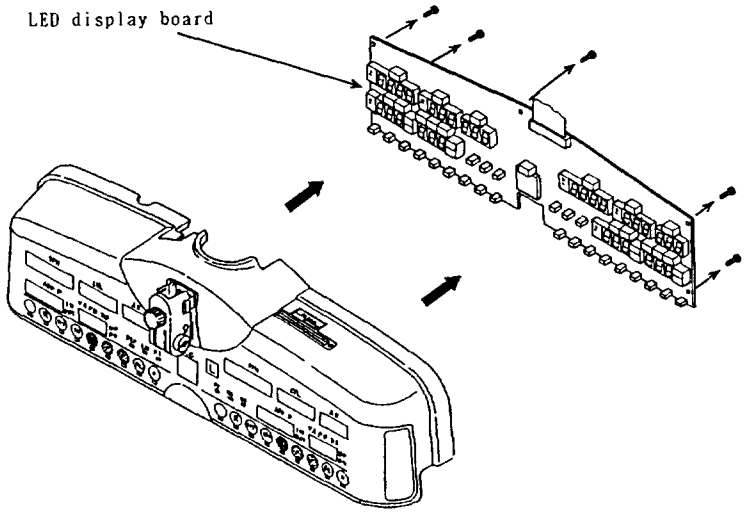
For RIGHT relay board: cut JP2 and JP4, but do not cut JP1 and JP3.
For LEFT relay board: cut JP1 and JP3, but do not cut JP2 and JP4

(Fig. 7-9)



7 – 4 Replacing the LED Display Board

① Remove the LED display cover (see 6-1 for the details).
② Remove the mounting screws (#415 X 5) and the LED display board (see Figure 7-10).



(Fig. 7-10)

③ Install the new LED display board and connect all connectors.
④ Replace the mounting screws (#415 X 5) to install the new board.
⑤ Attach the cover in the reverse order of disassembly and perform the Quick Inspection explained in Scetion 3-1.
If nothing wrong is detected in the inspection, the replacing procedure is complete.

7 – 5 R O M (how to identify the version number and replace ROM)

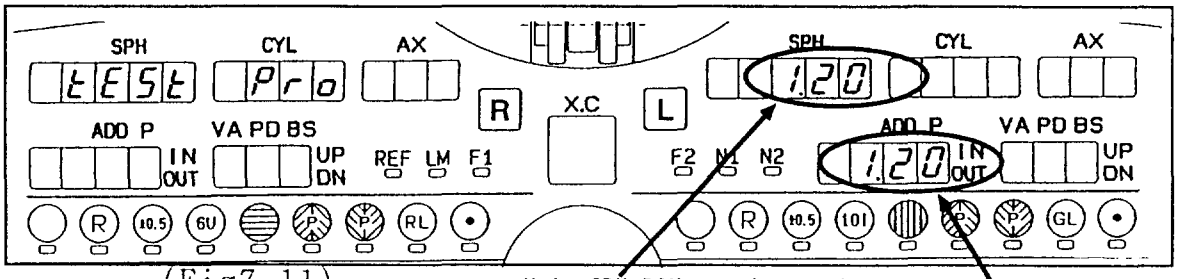
* How to identify the ROM version number: You can do this in the following two ways:

(1) The ROM version numbers are displayed for one second during the start-up process of a test program (see Figure 7-11).

(2) Press the print key at the test program mode, the ROM version number print out. (see Page 23, Test Program 6).

* Latest ROM version numbers for May 1997:

Main program (U2, U3) 1.20 Sub program (U35) 1.20



(Fig7-11)

*How to replace the ROM

① Make sure that the power is off (important).

② Remove the LED display cover, referring "6-1 Removing the LED display cover".

③ Remove the ROM from the CPU board and replace it with a new one (see Figure 7-1).

④ Attaching the LED cover completes the procedure. You do not need to adjust anything after replacing.

Caution: When you replace the ROM with SUB-CPU(U35), use the special tool (J39039 on Page 37) to pull out it. Otherwise, the socket may be damaged. When you order a U35, specify the version number of the ROM.

* ROM type (See Figure 7-1.)

① E P R O M (U2, U3): main program
Part number DCA00700 #501 (2): (3S162-011)
Type number HN27C101AG-10 : (1MB)

★ You can use a different ROM type number which is used for Retinomax (NRK8000).
Part number: DDA30000 #601 (2): (3S162-017) Type: MXC27C1000-90:(1 MB)

② P R O M with CPU (U35): sub-program
Part number DCA00700 #501 (23): (3S190-035)
Type number HD647180X0CP6 : (256KB)

★ You can use the same type part in the following devices:
Retinomax printer DDB30001 #25 (1): (RN754-06101)
NF-505 main unit AAA10700 #6101:

③ E E P R O M (U5): Compensation values for adjustments, eye examination program data, and initial setting data are in EEPROM.
EEPROM contains the data specific to the unit, so there is usually no need to replace with a new EEPROM. When you replace the CPU board, be sure to move this EEPROM to the new board.

7－6　Ａｄｊｕｓｔｉｎｇ　ＶＲ

① Adjusting VR on the CPU board

VR1: Controls the speaker volume (see figure 7-12).

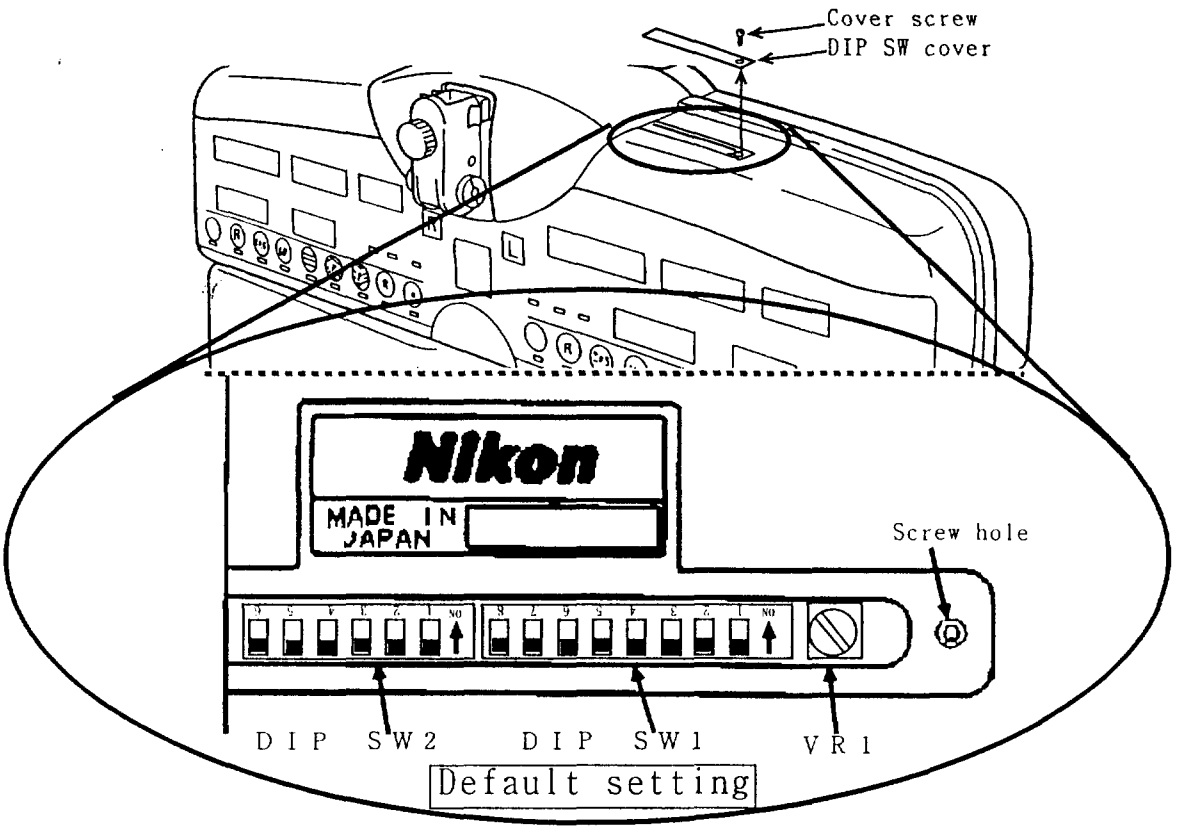
7－7　Ｔａｂｌｅ　ｏｆ　ＤＩＰ　ＳＷ　Ｓｅｔｔｉｎｇｓ (including the Remote Controller)

① ＤＩＰ　ＳＷ１ on the CPU board of the main unit

	ON	OFF
NO.1	Test program : Enabled	Disabled
NO.2	Continuous Rotation mode(Test Program-7): Enabled	Disabled
NO.3	Initialies the unit without No4&5 Initialization	DIsabled
NO.4～NO.7	Not used	
NO.8	The unit start without the initialization :Enabled	Disabled

② ＤＩＰ　ＳＷ２ on the CPU board of the main unit

No.1-6 Not used



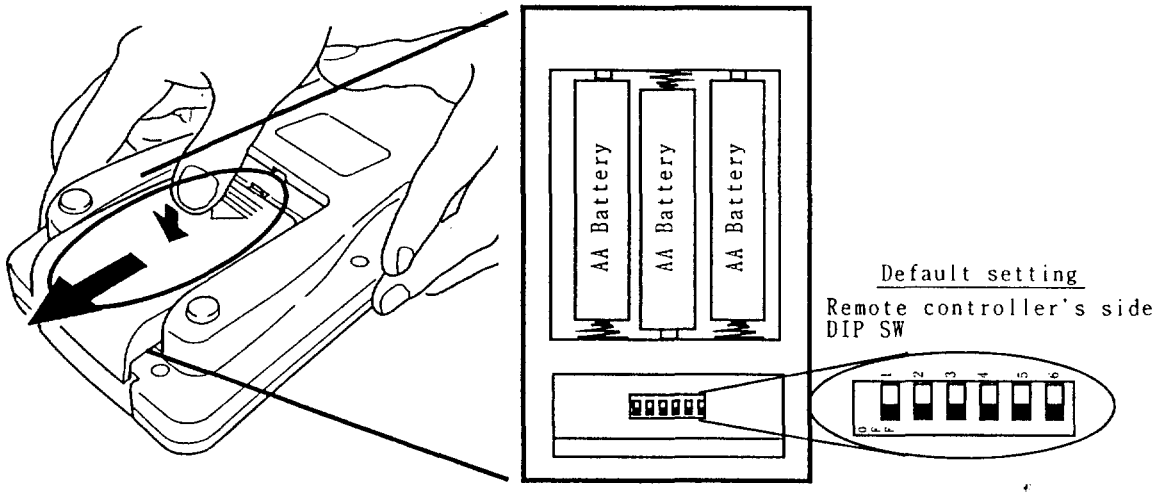
(Fig.7-12)

③ DIP SW on the relay board in the lens chambers
Each relay board in the right and left lens chambers has a DIP SW which is used to adjust the sensitivity of the sensor that sense the base position in each lens chamber.
For adjustment instructions, see the adjustments of motors and sensors (see 8 inspections and adjustments and Figure 7-1).

Right lens chamber	
R-Dip sw No.	R-Sensor No.
No.1	R-No1-sensor
No.2	R-No2-sensor
No.3	R-No3-sensor
No.4	R-No4-sensor
No.5	R-No5-sensor
No.6	R-No6-sensor
No.7	R-No7-sensor
No.8	R-No8-sensor

Left lens chamber	
L-Dip sw No.	L-Sensor No.
No.1	L-No6-sensor
No.2	L-No7-sensor
No.3	L-No8-sensor
No.4	L-No5-sensor
No.5	L-No4-sensor
No.6	L-No1-sensor
No.7	L-No2-sensor
No.8	L-No3-sensor

④ Remote controller DIP SW
No.1 Sets the remote controller ID
No.2 Sets the remote controller ID
No.3 Sets the remote controller ID
No.4-6 Not used
(See 12-2 Initial Settings Table) Communication Set(13)



(Fig.7-13)

⑤ For the settings of the DIP SW and VR of the Power Supply Box, see 10-5 (P70) and 10-6 (P71).

8 *Optical System Adjustments*

8－1 Remote Vision (RV) Tools

8-1-1 Tool Table

・Special tools (see 8-3.)

J-38081 Modification parts for lensmeter tool (excluding OL-5)
J-38102 Lens table for RV
J-38103 Relay extension cable (26 Pin)
J-38104 Relay extension cable (4 Pin)
J-38105 Relay extension cable (6 Pin)
J-38107 Relay extension cable (3 Pin)

J-39039 ROM extractor (for U35)

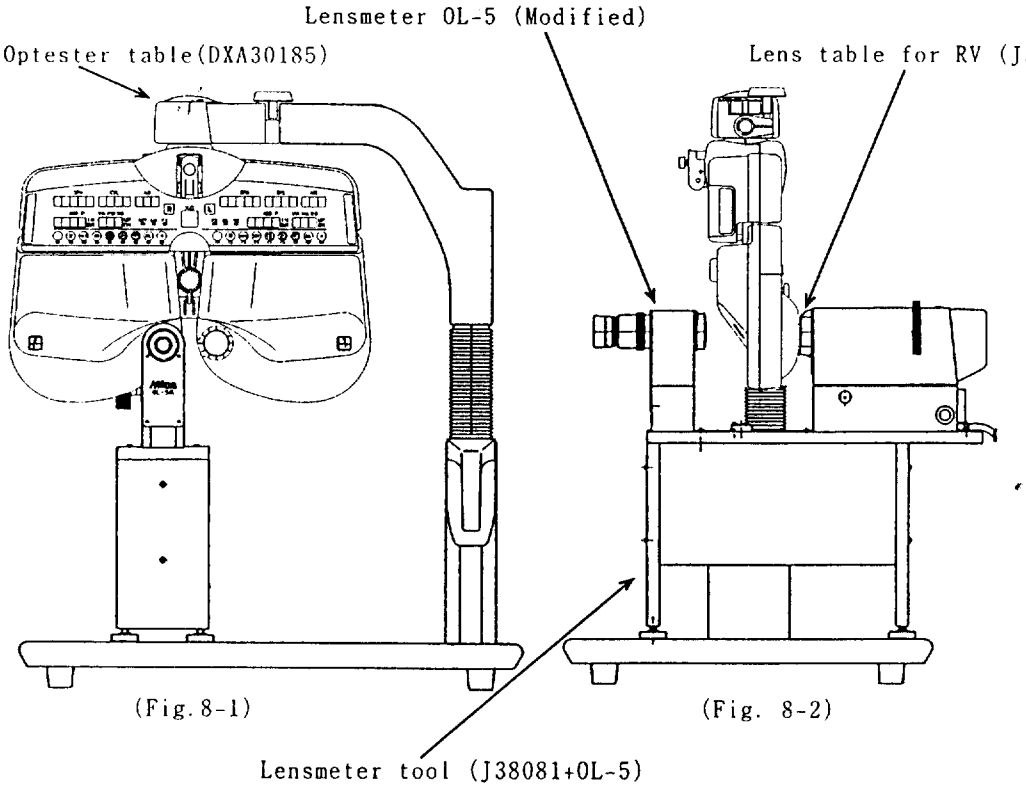
・The Products is used as a tool of RV.

DXA30185 Optester Table
Lensmeter OL-5 (needs to be adjusted and assembled for J38081)

・The Parts are used as a tool of RV.

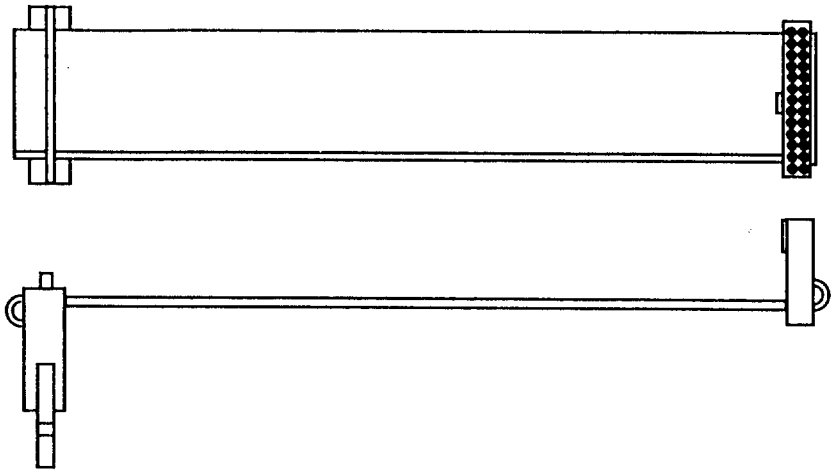
#511 D-SUB cable

8-1-2 Tools Installation Procedure



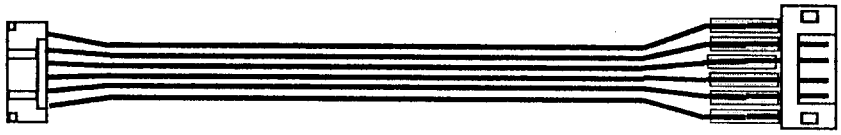
(Fig.8-1) (Fig. 8-2)

J－38103

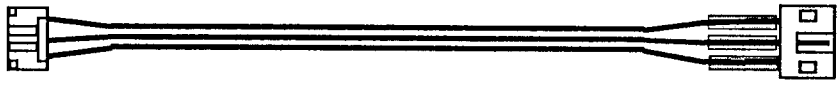


J－38104

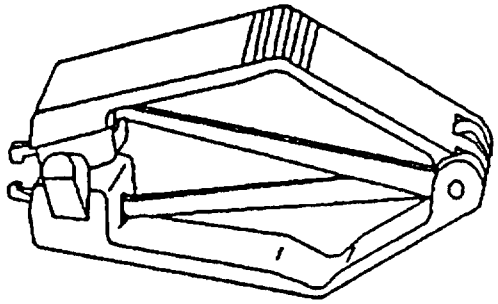
J－38105



J－38107



J－39039



(Fig. 8-3)

8-1-3 Daily inspection

① Lensmeter Tool(J-38080+OL-5)
Check if the power switch works properly.
Check if target position is in the center
Check if the measurement knob rotates smoothly.
② Extension cord tools (J-38103, 38104, 38105, 38107)
Check if there are any damage and continuity.
③ Lens table for RV
Check if there are any damage.

8－2 Checking and Adjusting the Convergence unit

8-2-1 Convergence inspection

① Check if the error number"010"or"110"is displayed after the power is turned on and the initialization process completes. If the motor starts and the sensor does not sense it, the error number is displayed. The reason for this may be one of the following:

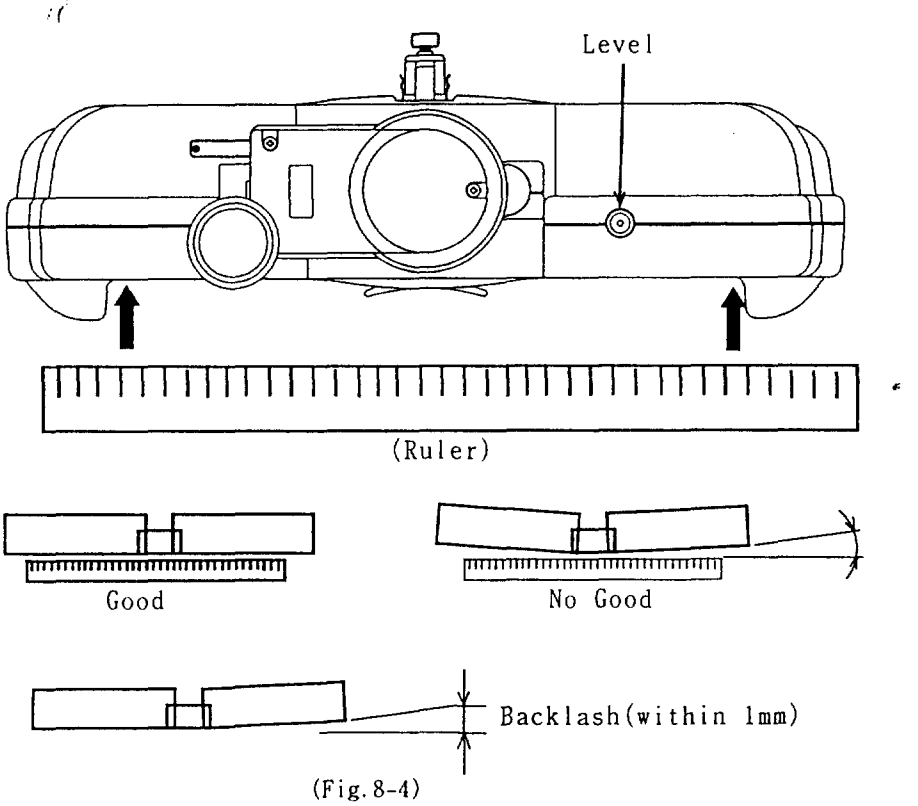
☆ Defective convergence motor
☆ Defective gears and shafts related to the convergence motor, maladjustment of gear mesh.
☆ Defective convergence sensor
☆ Disconnected cable, disconnected connector

② Start the main unit in the normal measuring mode.
Move the convergence with the remote controller several times. Make sure that it moves smoothly without making a sudden stop or an unusual noise.

(Press the following keys in this order.)
· (ADD) → (OFF) → (ADD) → (OFF)

If it stops suddenly or sounds unusual, the cause may be one of the following:
☆ Defective gears and shafts related to convergence adjustments, maladjustment of gear mesh.
☆ No space between parts, Maladjustment of gear mesh

③ Adjust the leveling of the main unit with the angle adjuster knob of the main unit (The bubble in the level should be within the circle).
Start the main unit in the normal measuring mode. Check the level of lenses in the right and left lens chambers by placing a ruler on the patient's side lens chamber cover. (see Figure 8-4).



(Fig.8-4)

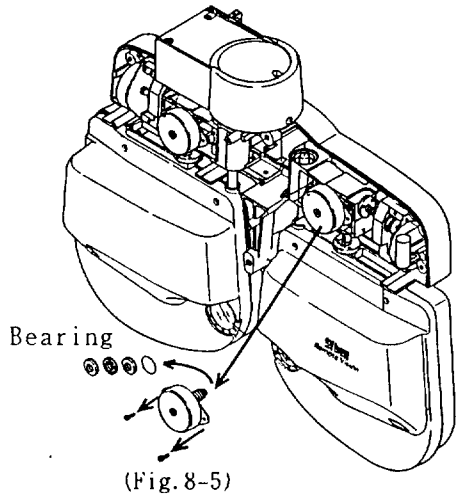
If the inspection result does not meet the standard, the cause may be one of the following:

☆ Maladjustment of the convergence compensation values.
See "8-2-4 Calibrating the convergence".

☆ Defective gears and shafts related to the convergence motor, maladjustment of gear mesh.

☆ No space between parts, maladjustment of gear mesh

8-2-2 Replacing the convergence motor



(Fig.8-5)

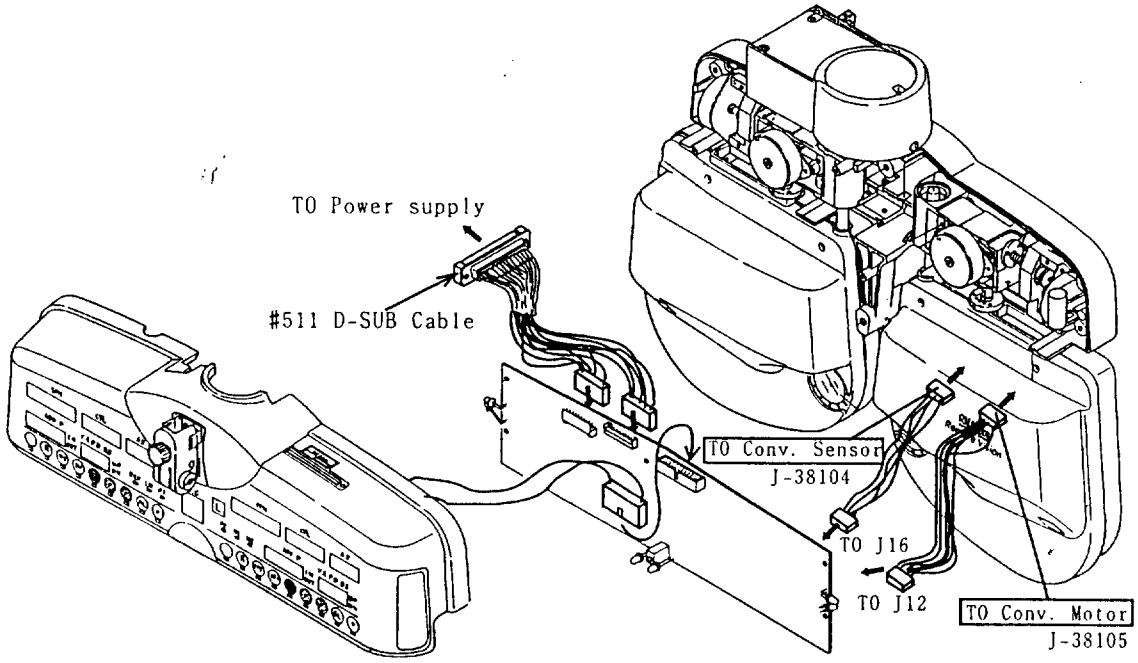
①Remove the CPU board, while referring to section "7-2 Replacing the CPU Board".

②Remove the screws and replace the motor.
Note: When you remove the motor, the bearings and spacer will fall off. Do not lose them.

③ Prepare J-38104, J-38105, #511 D-SUB Cable on hand.

④ Prevent the CPU board from a short circuit and connect the cables (J-38104, J-38105) and the parts (#511 D-SUB Cable). See Figure 8-6.

⑤ Go to step ④ in "8-2-3 Adjusting the mesh of the convergence motor".



(Fig.8-6)

8-2-3 Adjusting the mesh of the convergence motor

① Remove the LED display cover and the CPU board, while referring to section "7-2 Replacing the CPU Board".

② Connect J-38103 between the LED display board and the CPU board.

③ Connect J-38104 and J-38105 between the CPU board and the convergence sensor and the convergence motor respectively.

④ Adjust the driving power to 13V, while referring to section " 10-5 ①". Adjust the motor position by loosening the motor mounting screws.

⑤ Start the Test Program 2 (LM) to check the motor movements.
Adjust gear mesh so that the motor rotates smoothly without any unusual noise.
(Follow the steps below.)

- (LM) → (RIGHT) →10 (OFF) →JOG DIAL (To "+" direction)
- (LM) → (LEFT) →10 (OFF) →JOG DIAL (To "+" direction)

⑥ Reassemble the unit in the reverse order of disassembly.

⑦ Check the convergence adjusting function, while referring to section "8-2-1 Convergence inspection". After you complete the inspection, readjust the driving power to 16V, while referring to section 10-5①.

⑧ Perform the quick inspection explained in Section 3-1 before completing the replacement procedure.

8-2-4 Calibrating the convergence

① Set the DIP SW1- No.1 to ON and then turn on the power. A test program is started.

② Adjust the leveling of the main unit with the angle adjuster knob of the main unit (the bubble in the spirit level should be within the circle).
Place a ruler on the patient's side lens chamber cover and adjust the level in the pulse mode(Test program-1) so that there is no inclination of the lens toward the ruler (see Figure 8-4).

- (REF) → (RIGHT) →10 (OFF) →JOG DIAL
- (REF) → (LEFT) →10 (OFF) →JOG DIAL

③ Write the compensation values into EEPROM.
(Follow the steps below.)

- (REF) → (RIGHT) →10 (OFF) → (SET) → (SET)
- (REF) → (LEFT) →10 (OFF) → (SET) → (SET)

④ Check the level of lenses in the right and left lens chambers by placing a ruler on the patient's side lens chamber cover after initialization (see Figure 8-4).
(Follow the steps below.)

- (N1) → (RIGHT) →10 (OFF)
- (N1) → (LEFT) →10 (OFF)

⑤ If the inspection result does not meet the limit of tolerance, go back to step ②; otherwise, go to step ⑥.

⑥ Turn off the power and set the DIP SW1-No.1 to OFF. Turn on the power to start the main unit in the normal measuring mode. Check the level of lenses in the right and left lens chambers by placing a ruler on the patient's side lens chamber cover again.

8－3 Checking and Adjusting the PD unit

8-3-1 PD inspection

① Check if the error number"009"or"109" is displayed after the power is turned on and the initialization process completes.
If the motor starts and the sensor does not sense it, the error number is displayed.
The reason for this may be one of the following:

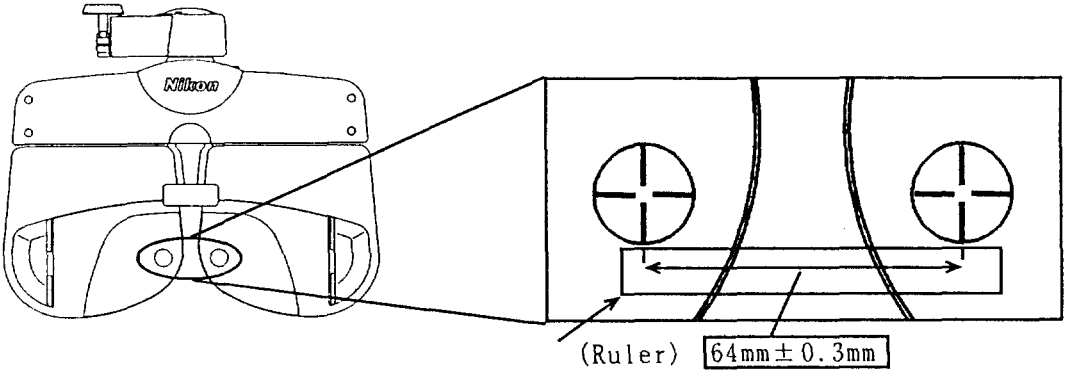
☆Defective PD motor.
☆Defective gears and shafts related to the PD motor, maladjustment of gear mesh.
☆Defective PD sensor.
☆Disconnected cable, disconnected connector.

② Turn the unit on in the normal measuring mode. Move the PD with the remote controller several times. Make sure that it moves smoothly without making stopping suddenly or sounding unusual.

(Press the following keys in this order.)
・(PD) → (R&L) →JOG DIAL (50mm～80mm) 25mm～40mm

If it stops suddenly or sounds abnormal, the cause may be one of the following:
☆Defective gears and shafts related to PD adjustments, maladjustment of gear mesh
☆No space between parts, Maladjustment of gear mesh

③ Turn the unit on in the normal measuring mode. Press the"PD"key to set in the PD mode. Make sure that the PD is within 64mm ± 0.3mm with a ruler.



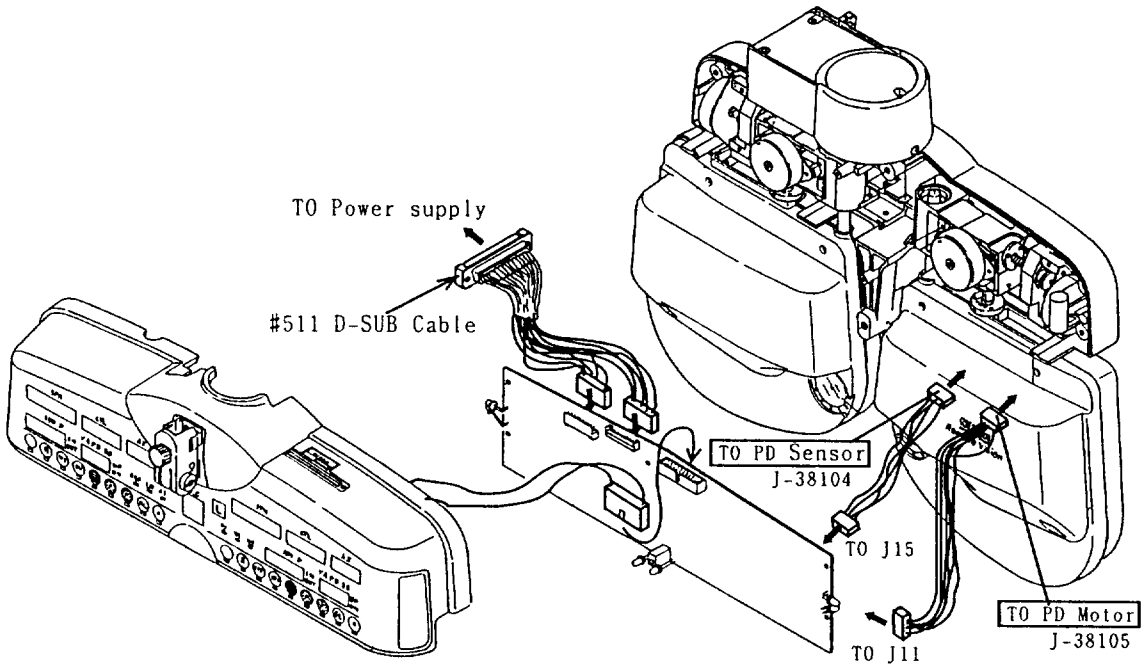
(Fig.8-7)

If the inspection result does not meet the limit of tolerances, the cause may be one of the following:

☆ Maladjustment of the PD compensation values. See "8-3-4 Calibrating the PD accuracy".
☆ Defective gears and rail parts
☆ No space between parts, Maladjustment of gear mesh

8-3-2 Replacing the PD motor

① Remove the CPU board, while referring to section "7-2 Replacing CPU Board".
② Remove the screws and replace with the new motor.
③ Place J-38104, J-38105, #511 D-SUB Cable on hand.
④ Prevent the CPU board from a short circuit and connect the cables (J-38104, J-38105) and the part (#511 D-SUB Cable). See Figure 8-8.
⑤ Go to step ③ in "8-3-3 Adjusting the mesh of the PD motor".



(Fig.8-8)

8-3-3 Adjusting the mesh of the PD motor

① Remove the LED display cover, while referring to section "6-1 Removing the LED display cover".
② Connect J-38103 between the LED display board and the CPU board.
③ Adjust the driving power to 13V, while referring to section "10-5①". Adjust the motor position by loosening the motor mounting screws.
④ Execute the Test Program 2 (LM) to check the motor movements.
Adjust gear mesh so that the motor rotates smoothly without unusual noise.
(Follow the steps below.)
· (LM) → (RIGHT) →9 (AUTO) →JOG DIAL
· (LM) → (LEFT) →9 (AUTO) →JOG DIAL
⑤ Reassemble the unit in the reverse order of disassembly.
⑥ Check the PD adjusting function, while referring to section "8-3-1 PD inspection". After you complete the inspection, readjust the driving power to 16V, while referring to section "10-5①".
⑦ Perform the Quick Inspection explained in Scetion 3-1.

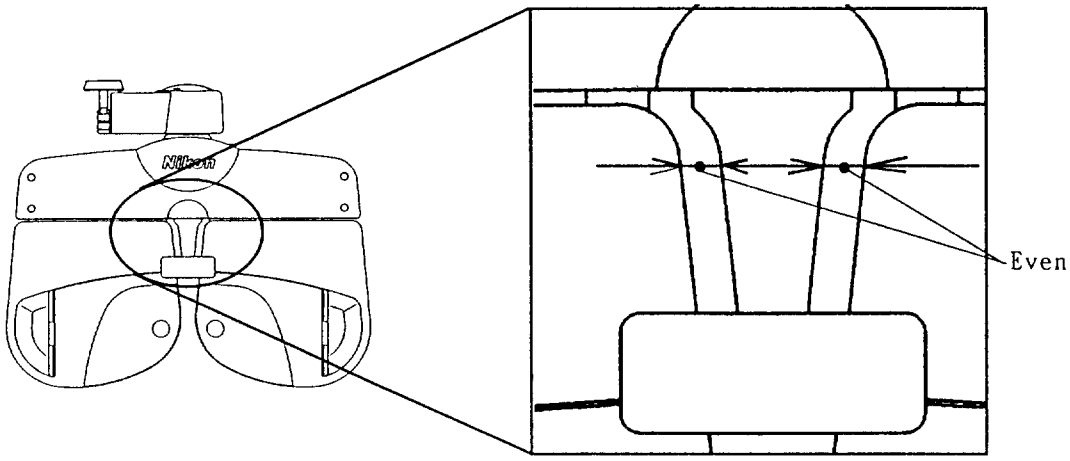
8-3-4 Calibrating the PD accuracy

① Set the DIP SW1- No.1 to ON and then turn on the power. A test program is executed.

② Set the cross-hair reticle of No.3 lens plate in the measuring window.
(Follow the steps below.)
· (F1) → (R&L) →3 (◁|▷) →JOG DIAL(+2 STEP)

③ Adjusting the lens chamber position
Move the right and left lens chambers inward separately to even position with the remote controller. They should be positioned properly as shown by Figure 8-9.

(Follow the steps below.)
· (REF) → (RIGHT) → (AUTO) →JOG DIAL(Set in the 10-pulse mode.)
· (REF) → (LEFT) → (AUTO) →JOG DIAL(Set in the 10-pulse mode.)



(Fig.8-9)

④ Adjusting standard width (64mm)
Adjust the width to 64mm ± 0.3mm with the remote controller by placing a ruler against the measuring window (see Figure 8-7).

(Follow the steps below.)
· (REF) → (R&L) →9 (AUTO) →JOG DIAL(Set in the 10-pulse mode.)

⑤ Write the compensation values into EEPROM.
(Follow the steps below.)
· (REF) → (RIGHT) →9 (AUTO) → (SET) → (SET)
· (REF) → (LEFT) →9 (AUTO) → (SET) → (SET)

⑥ Check if the width is within the range of 64mm ± 0.3mm (if a line overlaps another, it means the width is within the range).
(Follow the steps below.)
· (N1) → (R&L) →9 (AUTO)

⑦ If the width is out of range, go back to step ③, otherwise, go on to the next step.

⑧ Turn off the power and set the DIP SW1- No.1 to OFF. Turn the unit on in the normal measuring mode. Set in the PD mode to check if the width is within 64mm ± 0.3mm. If it is within the range, the replacing procedure is complete.
(Follow the steps below.)
· (PD)

8－4 Checking and Adjusting the Rotary cylinder

8-4-1 Rotary cylinder inspection

① Set the main unit under the Optester table (DXA30185) to adjust the level with the level of the unit. Turn the unit on. (see Figure 8-1) .

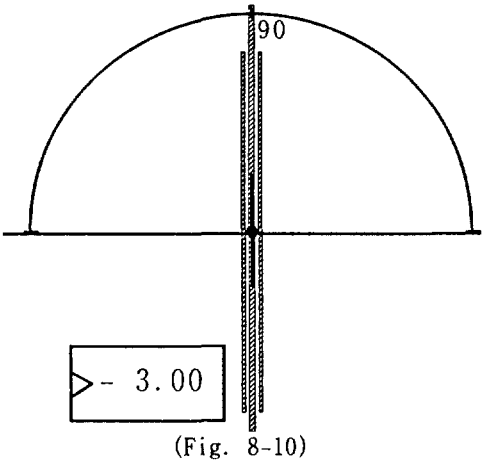
② Make sure that no error number is displayed after the initialization process completes and then look into the measuring window with the lensmeter.

③ Check whether the green target in both right and left lens chambers is in focus when the lensmeter indicates "0DP" as a lens power. Limit of tolerances: 0DP = within ± 0.03DP

If the inspection result does not meet the standard, go to "8-4-4 Calibrating the Rotary cylinder" (②).

④ Set the RV following value, "CYL -3.00DP AX90° ".

(Right) or (Left) → (CYL) →JOG DIAL(-3.00)→ (AX) →JOG DIAL(90)



(Fig. 8-10)

⑤ Set the focus of the lensmeter to "-3.00DP" to check if the target of the lensmeter is 90° . Limit of tolerances: -3.00DP = 90° ±2° (See Fig.8-10)

Note: Find the best focus point by adjusting the focusing handle and cylindrical axis rotation handle of the target.

If the inspection result does not meet the standard, go to "8-4-4 Calibrating the Rotary cylinder" (②).

⑥ Conduct a gear mesh inspection

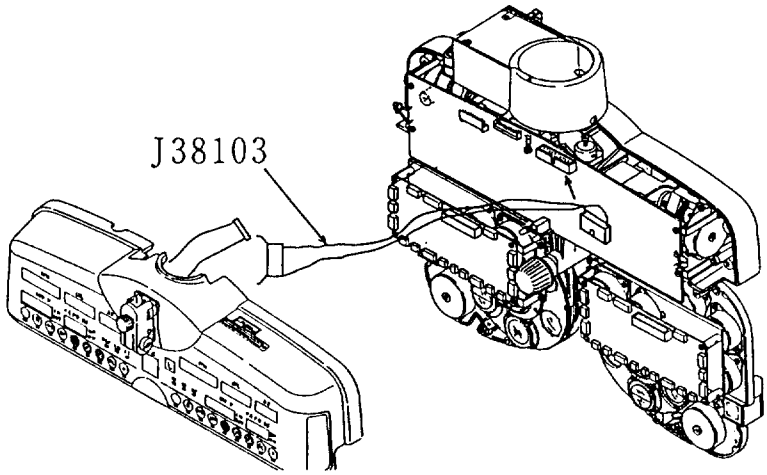
- Start a test program and execute Test Program -2. (Press the "LM "key)
- Select the lens chamber for inspection. (Press the "R" or "L" key)
- Select the motor number for gear mesh inspection. (Press the "4 ⇕ " or 5"SPH" key)
- Turn the jogdial to rotate the motor.
- If the motor does not rotate smoothly or makes an unusual noise, go to step ④ in 8-4-3.

⑦ If the motor rotates smoothly without any unusual noise, go to 8-5-1.

8-4-2 Cleaning and setting the Rotary cylinder Lens

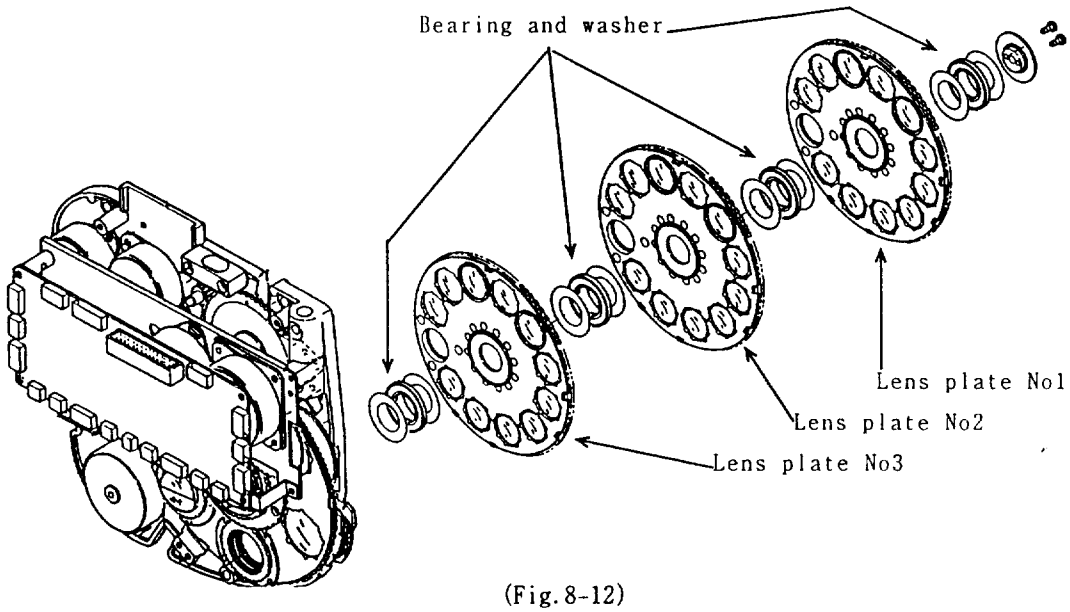
① Set the main unit under the Optester table (DXA30185) to adjust the level with the level of the unit

② Remove the display part and lens chamber covers (see 6-1 and 6-2 for details). Connect the relay extension cable (J38103, 26Pin) (see Figure 8-11). Turn the unit on and initialize the main unit.



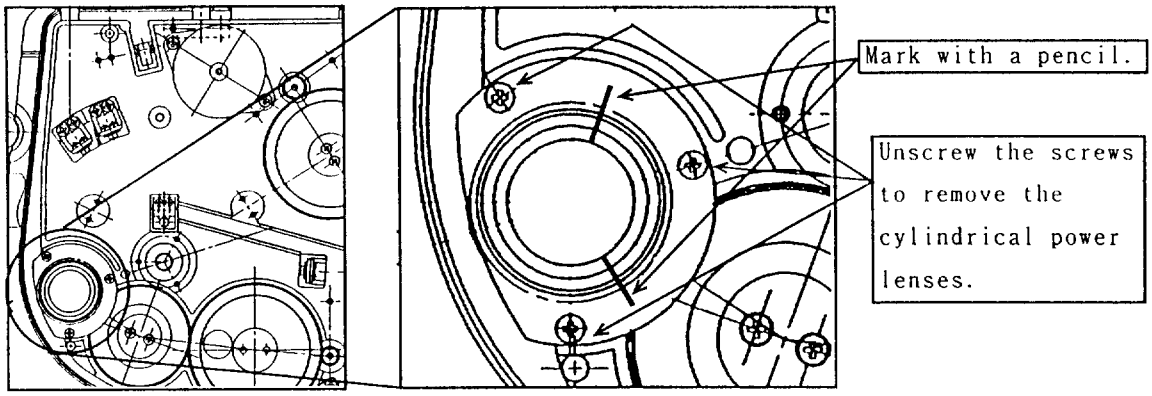
(Fig. 8-11)

③ Remove the lens plates (No.1 high-power lenses, No.2 for low-power lenses, No.3 for Auxiliary lenses) (see Figure 8-12)



(Fig.8-12)

④ Mark the rotary cylinder lens frame of the patient's side with a pencil (see Figure 8-13).
Unscrew the screws to remove the patient's side rotary cylinder lens (see Figure 8-13).

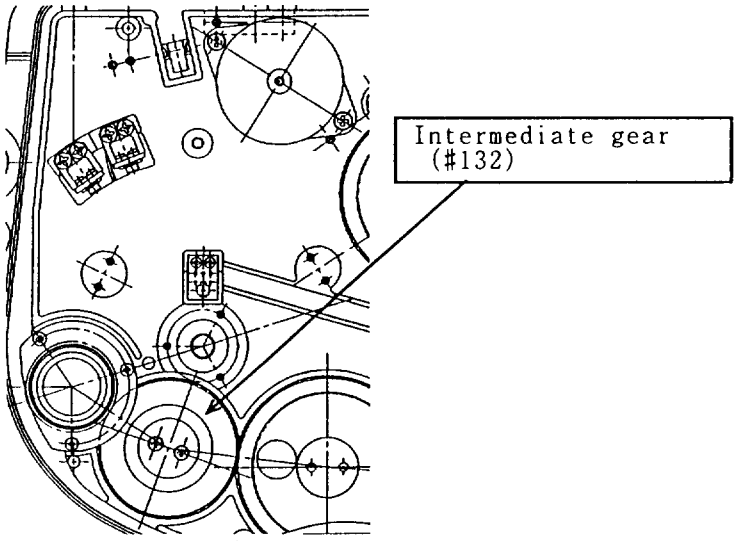


(Fig. 8-13)

⑤Clean the back-face(inside) of the rotary cylinder lenses.
⑥Set the patient's side rotary lenses using the pencil mark.
⑦Go to step ③in 8-4-3.

8-4-3 Replacing the motor for the rotary cylinders and adjusting its mesh
① Follow step ①and ②in 8-4-2.
③ If a motor is suspected to be defective, replace it with a new one by removing the screws. Otherwise, go to the next step.
④ If the rotary cylinder does not rotate smoothly or makes an unusual noise, adjust the gear mesh of the motors (No.4 and No.5) by loosening the mounting screws.
⑤ Conduct a gear mesh inspection.
- Start a test program and execute Test Program -2. (Press the "LM "key)
- Select the lens chamber for inspection. (Press the "R" or "L" key)
- Select the motor number for gear mesh inspection. (Press the "4 ⇕" or 5"SPH" key)
- Turn the jogdial to rotate the motor.

⑥ If the movements or noise problem is not corrected, go back to step ④ and readjust the position of the motor and intermediate gear(#132). (see Figure 8-14)

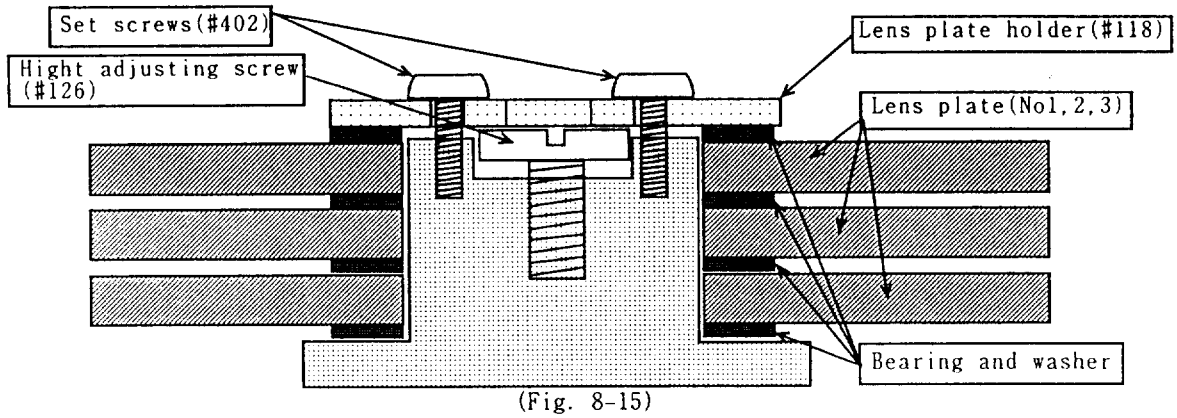


(Fig. 8-14)

⑦ Clean the lens plates(No1,2,3) if necessary, and mount them.

Note: Adjust the height adjusting screw (#126) so that the set screws (#402) for the lens plate holder (#118) can not be screwed in too tightly (see Figure 8-15).

⑧ Go to section 8-4-4.



(Fig. 8-15)

8-4-4 Calibrating the Rotary cylinder (Entering compensation values)

· Supported by ROM Ver.1.20 or later

①Set the main unit under the Optester table (DXA30185) to adjust the level with the level of the unit

Set the DIP SW - No.4 and 5 on the right relay board to OFF.

Set the DIP SW - No.4 and 5 on the left relay board to OFF.

② Adjust the compensation value (Excitation pattern compensation value) for the sensor.

(1) Set the DIP SW 1- No.1 to ON. Turn the unit on to execute a test program.

(2) Select the lens chamber to adjust (press the "Right" or "Left" key).

(3) (R E F) → (N 1) →4 (◇) → (A C) → (A C)

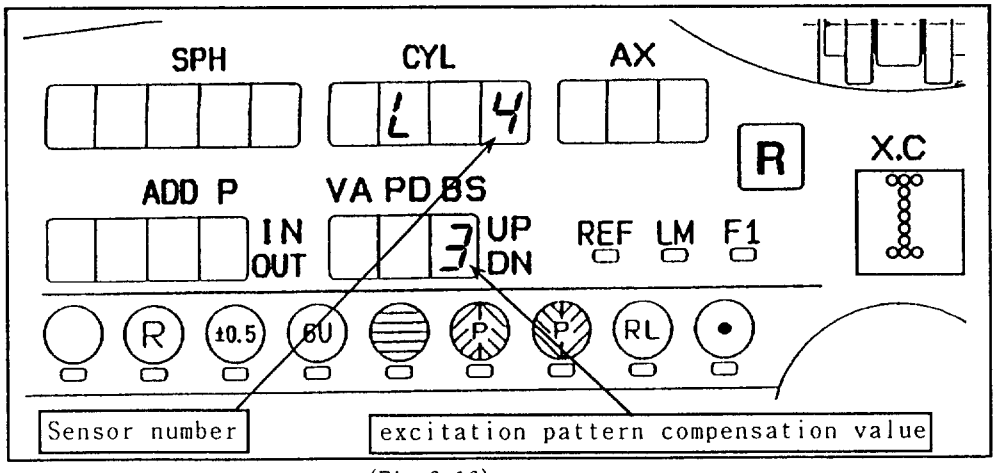
* Repeat section 8-4-4 ② step (3) a couple of times to check if the excitation pattern compensation value variance within ±1 on the display (see Figure 8-16).

(Example) Changes of No.4 excitation pattern compensation value = 2 → 2 → 1 → 2 → 2 (Good)
2 → 2 → 0 → 2 → 2 (No good)

If it changes ±2, adjust the motor angle and the sensor position, while referring to section "8-4-3". Repeat section 8-4-4 ② step (3) after necessary adjustments.

(4) If the excitation pattern compensation value variance within the range, store it in EEPROM..

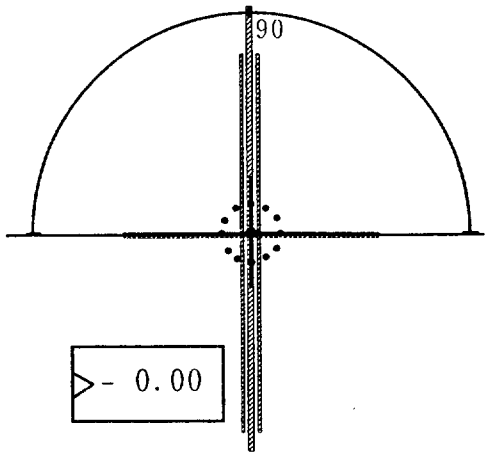
(R E F) →4 (◇) → (S E T) → (S E T)



(Fig.8-16)

(5) (R E F) → (N 1) →5 (S P H) → (S E T) → (S E T)
Change the motor number and take the steps from (3).

③ Adjust the cylinder lens focus and angle.

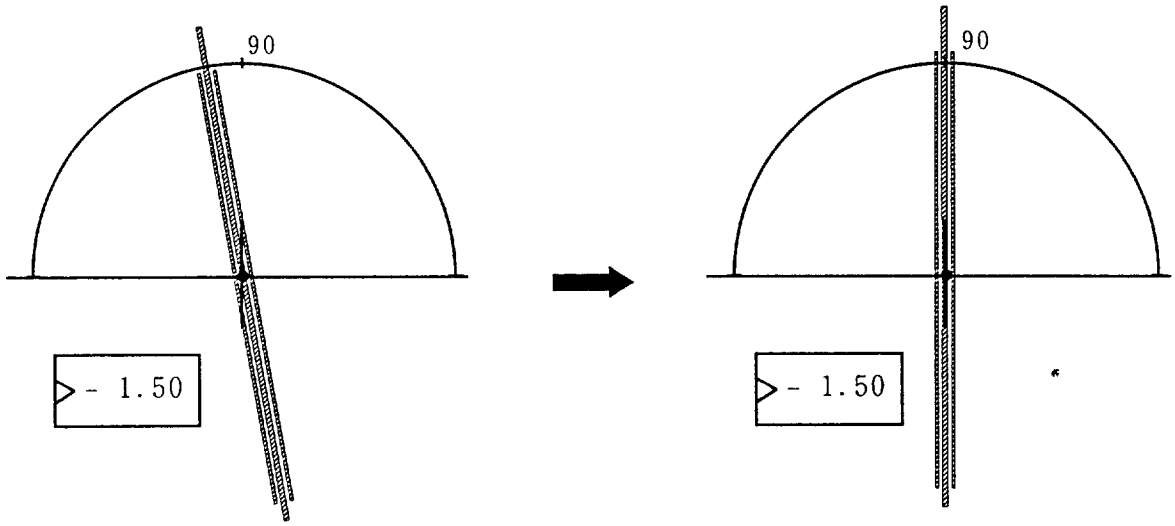


(Fig. 8-17)

(1) Attach the patient's side cover.
(2) Adjust the level on the unit.
Set the lensmeter and target to 0DP and 90° respectively.
(3) Set the DIP SW 1- No.1 to ON.
Turn the unit on to execute a test program.
(4) Select the lens chamber to adjust.
Press the "Right" or "Left" key.
(5) Press the keys in this order to initialize.
(R E F) → (N 1) →4 (▲▼) →5 (S P H)
(6) You can adjust the focus with the jog dial after you press the (R E F) →4 (▲▼) keys.
Find the best focus point (see Figure 8-17).

(7) Press the (R E F) → (N 1) →4 (▲▼) →5 (S P H) keys in this order to initialize the program again.
(8) Pressing the (R E F) → (C+/-) keys displays "-3.00" on the LED display.
(9) Adjust the lensmeter to "-1.50DP".
(10) Adjust the focus on the 90° target with the jog dial (see Figure 8-18).

Note: If you find a difficulty in focusing, adjust the focus or angle of the lensmeter.
Limit of tolerances: 90° ±0.3°



(Fig.8-18)

(11)Write the compensation values after necessary adjustments.

4 (▲▼) → (F 2) → (S E T) → (S E T)
5 (S P H) → (F 2) → (S E T) → (S E T)

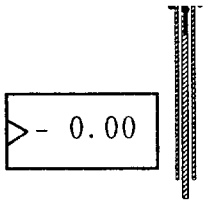
④ Change to the confirmation mode. Check if the rotary cylinder accuracy meets the standard, while referring to section "8-4-1③to⑤".

Press the (NEXT) key and check the accuracy, referring 8-4-1 ③to⑤.

⑤ If the accuracy does not meet the standard, adjust the level on the main unit. Set the lensmeter and target to 0DP and 90° respectively. Go back to step ② and check again the accuracy in the test mode.

Press the (NEXT) key to return to test mode and go back to the step ②.

⑥ If the accuracy meets the standard, go to 8-5-1.

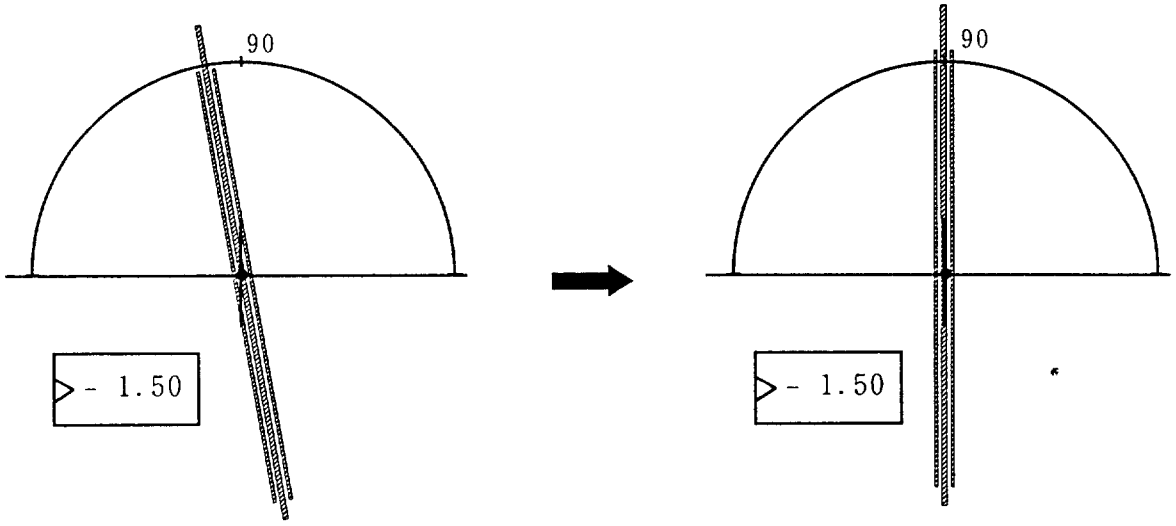


(Fig. 8-17)

(5) Press the keys in this order to initialize:
(REF) → (N1) →4 (△▽) →5 (SPH)
(6) You can adjust the focus with the jog dial after you press the (REF) →4 (△▽) keys. Find the best focus point (see Figure 8-17).

(7) Press the (REF) → (N1) →4 (△▽) →5 (SPH) keys in this order to initialize the program again.
(8) Pressing the (REF) → (C+/-) keys displays "-3.00" on the LED display.
(9) Adjust the lensmeter to "-1.50DP".
(10) Adjust the focus on the 90° target with the jog dial (see Figure 8-18).

Note: If you find a difficulty in focusing, adjust the focus or angle of the lensmeter.
Limit of tolerances: 90° ±0.3°



(Fig.8-18)

(11)Write the compensation values after necessary adjustments.

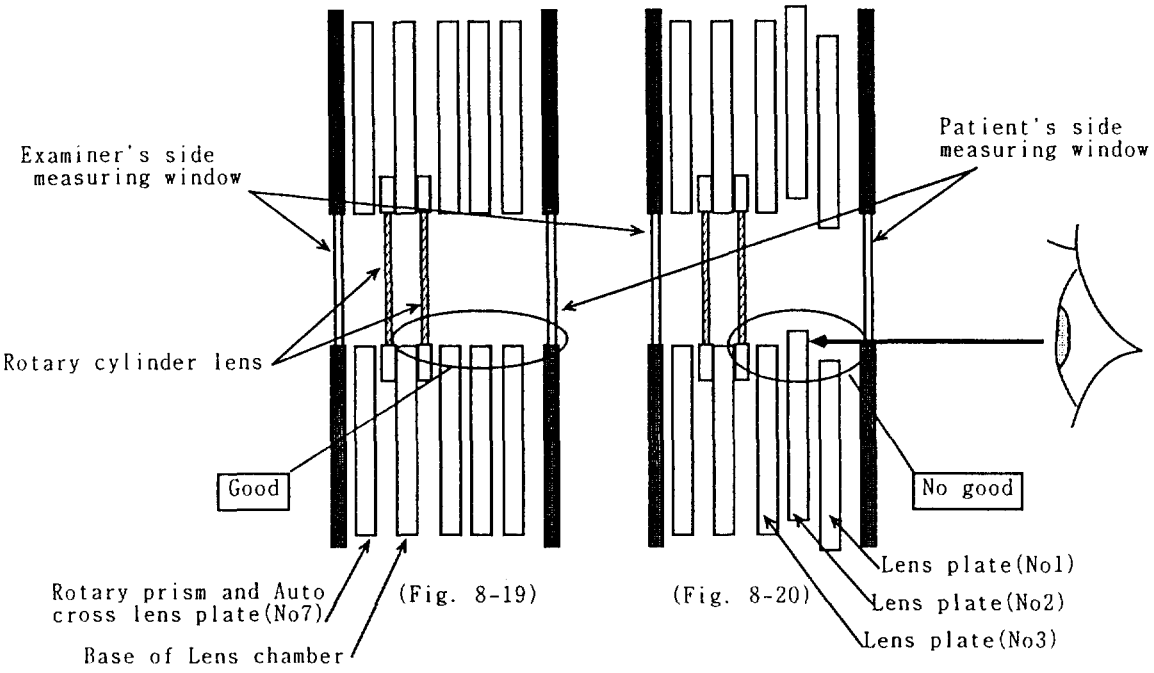
4 (△▽) → (F2) → (SET) → (SET)
5 (SPH) → (F2) → (SET) → (SET)

8－5 Checking and Adjusting the Lens Plate
(No1.H-Power, No2.L-Power, No3.Aux)

8-5-1 Lens Plate inspection

① Set the main unit under the Optester table (DXA30185) to adjust the level with the level of the unit. Turn the unit on. (see Figure 8-1) .

② Make sure that no error number is displayed after the initialization process completes and then check if the lens frames are aligned by visual inspection (see Figure 8-19 and 8-20).



③ If the lens frames are aligned irregularly, go to "8-5-5 Adjusting the Lens plates position" (①); otherwise, go to the next step.

④ Check the gear mesh of the motor.

- Start a test program and execute Test Program -2. (Press the "LM "key)
- Select the lens chamber for inspection. (Press the "Right" or "Left" key)
- Select the motor number for gear mesh inspection.
  1 (P D) No1 motor
  2 (A D D) No2 motor
  3 (◁▷) No3 motor
- Turn the jogdial to rotate the motor.
- If the motor does not rotate smoothly or makes an unusual noise:
  Check if the set screws to attach the lens holder are screwed in too tightly, referring 8-5-2, or readjust the gear mesh, referring 8-5-3.

⑦ If the motor rotates smoothly without any unusual noises, go to 8-6-1.

8-5-2 Disassembling and reassembling lens plates

① Set the main unit under the Optester table (DXA30185) to adjust the level with the level of the unit. (see Figure 8-1) .

② Remove the display part and lens chamber covers (see 6-1 and 6-2 for the details). Connect the relay extension cable (J38103, 26Pin) (see Figure 8-11). Turn the unit on and initialize the main unit.

③ Remove the lens plates (No.1 H-lenses, No.2 L- lenses, No.3 Aux.) (see Figure 8-12).

④ Disassemble the rotary cylinder, clean and replace lens plates as required.

⑤ Clean and set the lens plate (No.1, No.2, No.3.).
Note: Do not use strong solvents for cleaning the Auxiliary lenses plate, but remove the dust with a blower.
⑥ Go to step ② in 8-5-3.

8-5-3 Adjusting the motor mesh for the lens plates and sensor position
① Set the main unit under the Optester table (DXA30185).
② Remove the display part and lens chamber covers (see 6-1 and 6-2 for the details).
Connect the relay extension cable (J38103, 26Pin) (see Figure 8-11).
Set the driving power to 13V. Adjust the VR1 on the power supply board. See 10-5①.
Turn the unit on and initialize the main unit.

③ Check the gear mesh of the motor.
- Start a test program and execute Test Program -2. (Press the "LM "key)
- Select the lens chamber for inspection. (Press the "Right" or "Left" key)
- Select the motor number for gear mesh inspection.
  1 (P D) No1 motor
  2 (A D D) No2 motor
  3 (◁▷) No3 motor
- Turn the jogdial to rotate the motor.

④ If the motor does not rotate smoothly or makes any unusual noise, adjust the gear mesh by loosening the motor (No.1, No.2, and No.3) position.

Note: Adjust the height adjusting screw (#126) so that the set screws (#402) for the lens plate holder (#118) can not be screwed in too tightly (see Figure 8-15).

⑤ Adjust the sensor position.
(1) Set the DIP SW 1- No.1 to ON. Turn the unit on to execute a test program.
(2) Select the lens chamber to adjust (press the "Right" or "Left" key).
(3) Initialize the lens chamber.

(R E F) → (N 1) →1 (P D) No1 motor
(R E F) → (N 1) →2 (A D D) No2 motor
(R E F) → (N 1) →3 (◁▷) No3 motor

(4) Read the changes of the voltage data of the sensor.
Turn the jog dial to the minus direction(clockwise) one step at a time.

(R E F) →1 (P D) → J O G D I A L("-"direction)
Standard: LOW = 350-500 HI = less than 50

(5) If the inspection result does not meet the standard, adjust the sensor.
Intermediate value = If the result shows the value within the range of 51-349, adjust the sensor so that the value is within the range of "LOW" or "HI" (or intermediate values should not be displayed). If the values can not be adjusted to within the range by the adjustments of the sensor, change the sensor sensitivity by changing the DIP SW settings on the relay board.

Right relay board DIP SW-1 = sensor number 1
DIP SW-2 = sensor number 2
DIP SW-3 = sensor number 3
Left relay board DIP SW-6 = sensor number 1
DIP SW-7 = sensor number 2
DIP SW-8 = sensor number 3

(6) If the inspection result meets the standard, select the No2 motor by pressing 2 (A D D) key and go back to step (4). Repeat to adjust until the No3 motor.

8-5-4 Cleaning the lens plates and attaching the cover on the patient's side

① Check the lens plates (No.1, No.2, and No.3), while referring to section "9-2 Cleaning the Optical Parts of the Lens Plates" and clean them if dust or stains are found by visual inspection.

② If Small Screw Threadlocker is necessary, apply it. Attach the patient's side cover.

③ Go to 8-5-5.

8-5-5 Adjusting the lens plate position

① Adjust the lens frame position to the measuring window frame of the cover.
(See fig.8-19, 8-20)

(1)Set the DIP SW1 - No.1 to ON. Turn the unit on to execute a test program.
(2)Select the lens chamber to adjust (press the "Right" or "Left" key).
(3)Align the measuring window frame with the lens frame.

(REF) →1 (PD) →JOG DIAL→ (F2) → (SET) → (SET)
(REF) →2 (ADD) →JOG DIAL→ (F2) → (SET) → (SET)
(REF) →3 (◁▷) →JOG DIAL→ (F2) → (SET) → (SET)

(4)Check if the measuring window frame of the cover is aligned with the lens frame after successive initialization (see Figure 8-19 and 8-20).

② If you adjusted lens plate No-1, match the optical axis of the lens plate (No.1) with that of the auto cross and rotary prism plate

③ Check the lens plate position again .Go to "8-5-1" .

8－6 Checking and Adjusting the auto cross and rotary prism plate

8-6-1 Auto cross and rotary prism plate inspection

① Set the main unit under the Optester table (DXA30185) to adjust the level of the unit. Turn the unit on. (see Figure 8-1) .

② Make sure that no error number is displayed after the initialization process completes.

③ Check the gear mesh of the motor.

- Start a test program and execute Test Program -2. (Press the "LM "key)
- Select the lens chamber for inspection. (Press the "Right" or "Left" key)
- Select the motor number for gear mesh inspection.
  - 6 (CYL) No6 motor
  - 7 (AX) No7 motor
  - 8 (XC1) No8 motor
- Turn the jogdial to rotate the motor.
- If the motor does not rotate smoothly or makes an unusual noise:
  Check if the set screws to attach the lens holder are screwed in too tightly, referring 8-6-2, or readjust the gear mesh, referring 8-6-3.

④ Print out the compensation values (see Page 23, 5-3 Test Program 6).

- Execute the test program and then press the "PRINT" key.

⑤ Check if the excitation pattern compensation value varies within ±1 of the printed data .

(1) Turn the unit on to execute a test program.

(2) Select the lens chamber for the inspection (press the R or L key).

(3) (REF) → (N1) →6 (CYL) → (AC) → (AC) → (AC)
7 (AX) → (AC) → (AC) → (AC)
8 (XC1) → (AC) → (AC) → (AC)

* Repeat section step (3) a couple of times to check if the excitation pattern compensation value varies within ±1 of the printed data . (see Figure 8-16).

If it changes ±2, adjust the motor angle and the sensor position, and readjust the excitation pattern compensation value referring 8-6-4.
Adjust the following section after compensation value adjustment.
8-6-5 Adjusting the optical axis
8-6-6 Adjusting the rotary prism accuracy
8-6-7 Adjusting the auto cross accuracy

⑥ Inspection of auto cross and rotary prism plate(No7) position.....Optical axis
Adjust the level of the main unit. Attach the patient's side cover and align the lensmeter tool with the measuring window.

- Change to the normal measuring mode and set "-15D" in the measuring window.
  Select the "Right" or "Left" key→Press the "SET & IN" key→Turn the Jog dial to "-15 D" → press the"SET & IN" key again.
- Find the best focus on the target by adjusting the focusing handle of the lensmeter (checking -15D).
- Adjust the lensmeter target position to the center of reticle.
  To adjust vertically, adjust the height of the Optester table or lensmeter.
  To adjust horizontally, slide the lensmeter right and left.
- Set -25D in the measuring window.
  Select the "Right" or "Left" key→Press the SET & IN key→Turn the Jog dial to "-25 D" and press the "SET & IN" key.
- Find the best focus on the target by adjusting the focusing handle of the lensmeter. (checking -25D).

If the target position is out of the center vertically, adjust it, while referring to section "8-6-5 Adjusting the optical axis". The standard for -25D is less than 0.5△.

⑦ Inspection of rotary prism

Adjust the level of the main unit. Attach the patient's side cover and align the lensmeter tool with the measuring window.

・Initialize(press the "AC" key twice) the unit once in the normal mode, and then press the horizontal prism keys (◁▷) .

When the lensmeter is set to 0DP;

The target position should be less than 0.25△.

The target position should be less than 0.25△ both at 5△BI and 5△BO.

If the position is out of the standard range, adjust it, referring "8-6-6 Adjusting the rotary prism accuracy".

⑧ Inspection of auto cross

Adjust the level of the main unit. Attach the patient's side cover and align the lensmeter tool with the measuring window.

・Adjust the lensmeter green target and crosslines angle to match 180° .

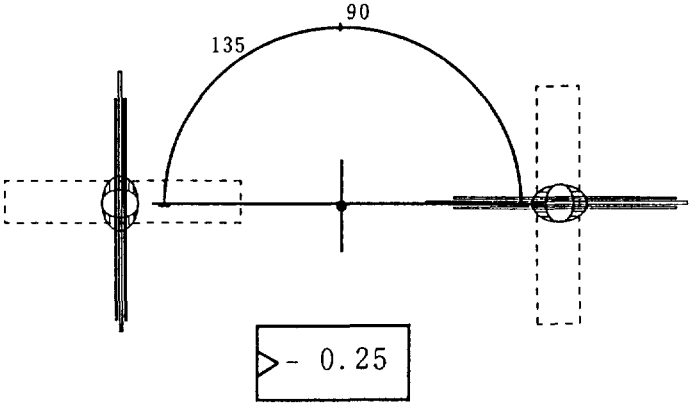
・Initialize(press the "AC" key twice) the unit once in the normal mode, and Select the "Right" or "Left" key for lens chamber. Press (AUTO) → (CYL) .

・You will see two green targets. Focus on them for -0.25D (R) and +0.25D (L) in turn.

Standard = The two green targets should be within 180° ±3° (see Figure 8-21).

If the targets are out of the standard range, it means the accuracy is not adjusted properly. Readjust it, referring "8-6-7 Adjusting auto cross accuracy".

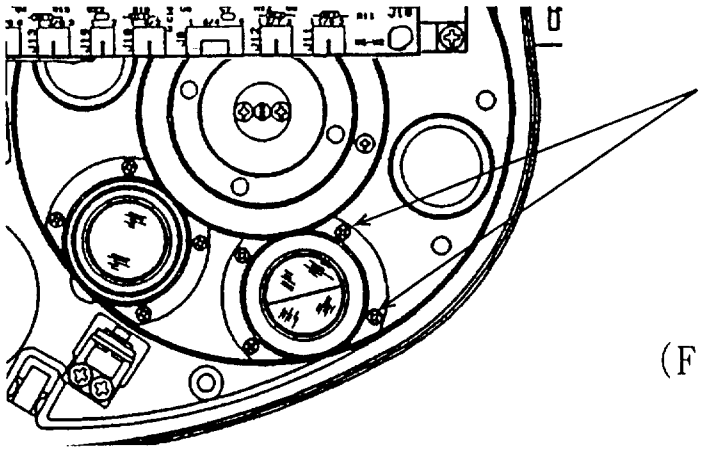
When the focus of the lensmeter is -0.25, right target is in focus toward 180° (horizontally).



(Figure 8-21)

(1) If the right target is not in focus but the left target is in focus toward 180° , the auto cross lenses are loaded opposite. Remove the 4 mounting screws and the auto cross lenses, turn the auto cross lenses by 180° and reload the lens. (see figure 8-22 on Page 55).

(2) Readjust the auto cross accuracy, referring 8-6-7.



(Fig.8-22)

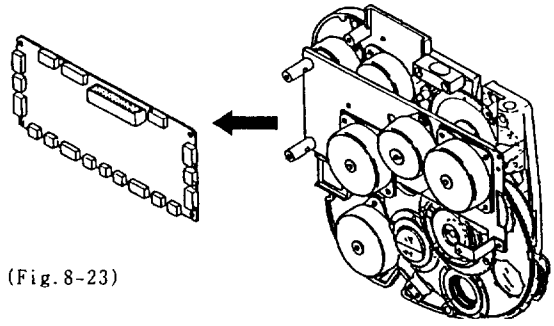
⑨ Check if there is dust on the glass after the inspection while referring to section "9-2 Cleaning the Optical Parts of Lens Plate".

8-6-2 Removing and setting Auto cross and Rotary prism plate assembly

① Set the main unit under the Optester table (DXA30185)

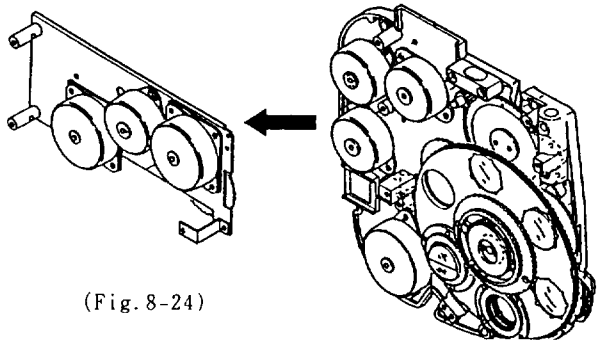
② Remove the display part and lens chamber covers (see 6-1 and 6-2 for the details).

③ Remove the relay board.

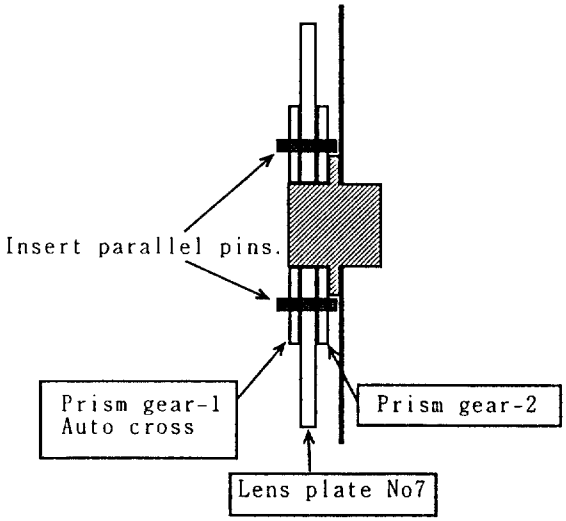


(Fig.8-23)

④ Remove the motor assembly.

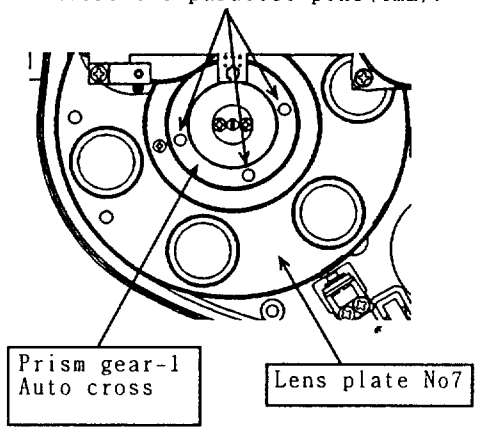


(Fig.8-24)



(Fig. 8-25)

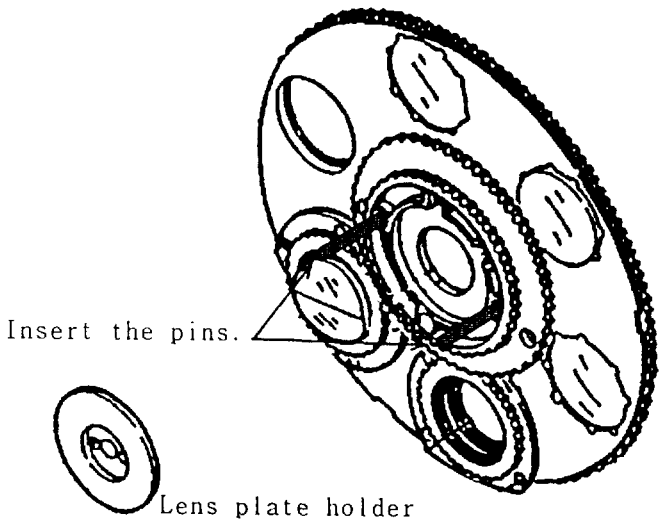
Align the positions of the holes to insert two parallel pins(4mm).



(Fig. 8-26)

Align the positions of the three holes (prism gear, Lens plate, and prism gear 2) and insert the two 4mm parallel pins through them.

⑤ Unscrew the screws (#402) to remove the lens plate holder (#118), remove the Auto cross and rotary prism plate carefully with the pins inserted. (See Fig. 8-26A)



(Fig. 8-26A)

Note: Remove the lens plate(No7) with prism gear so that the bearings and washers between them do not fall off.

⑥ Replace rotary cylinder lenses or make the necessary adjustments.
⑦ After you clean the Auto cross and Rotary prism plate assembly and attach them, pull out the pins.
⑧ Go to step ④in 8-6-3.

8-6-3 Attaching the motor assembly parts and adjusting gear mesh

① Set the main unit under the Optester table (DXA30185)

② Remove the display part and lens chamber covers (see 6-1 and 6-2 for the details).
Connect the relay extension cable (J38103, 26Pin) (see Figure 8-11).

③ Got to step ⑥.

④ Attach the motor assembly (No.6, 8, and 7) (see Figure 8-24).

⑤ Attach the relay board. Connect all connectors, referring the block diagram.

⑥ Set the driving power to 13V (see 10-5①) Turn on the unit.

⑦ Check the gear mesh.

- Start a test program and execute Test Program 2 (press the "LM "key).
- Select the lens chamber for inspection (press the "Right" or "Left" key).
- Select the motor number for gear mesh inspection.

(C Y L) No6 motor
(A X) No7 motor
(X C 1) No8 motor

- Turn the jog dial to rotate the motor.

⑧ If the motor does not rotate smoothly or makes any unusual noise, adjust the gear mesh by loosening the motor (No.6, No.7, and No.8) position.

Note: Adjust the height adjusting screw (#126) so that the set screws (#402) for the lens plate holder (#118) can not be screwed in too tightly (see Figure 8-15).

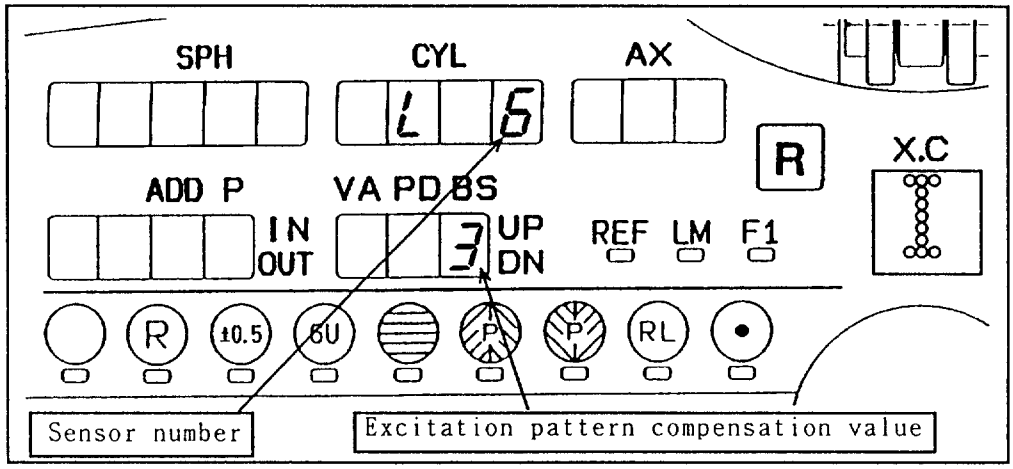
⑨ Reset the power supply to 16V after the inspection.

8-6-4 Adjusting the excitation pattern compensation value

① Set the main unit under the Optester table (DXA30185) (see Figure 8-1).
② Remove the display part and lens chamber covers (see 6-1 and 6-2 for the details).
Connect the relay extension cable (J38103, 26Pin) (see Figure 8-11).
③ Set the driving power to 13V (see 10-5①) Turn the unit on. (see Figure 8-1).
④ Enter the excitation pattern compensation values (which stabilize the motor position).
(1) Set the DIP SW1- No.1 to ON and then turn on the power. A test program is started.
(2) Select the lens chamber for inspection press the (R i g h t) or (L E F T) .
(3) (R E F) → (N 1) →6 (C Y L) → (A C) → (A C)
* Repeat section 8-6-4 ④, step (3) a couple of times to check if the excitation pattern compensation value value varies within ±1 on the display (see Figure 8-27).

(Example) Changes of No.6 excitation pattern compensation value: 2→2→1→2→2 (GOOD)
2→2→0→2→2 (NOT GOOD)

If it changes ±2, adjust the motor angle and the sensor position, referring 8-6-3.
Repeat section 8-6-4 ④, step (3) after necessary adjustments.



(Fig.8-27)

(4)If the excitation pattern compensation value varies within the range, store it in EEPROM.
(R E F) →6 (C Y L) → (S E T) → (S E T)

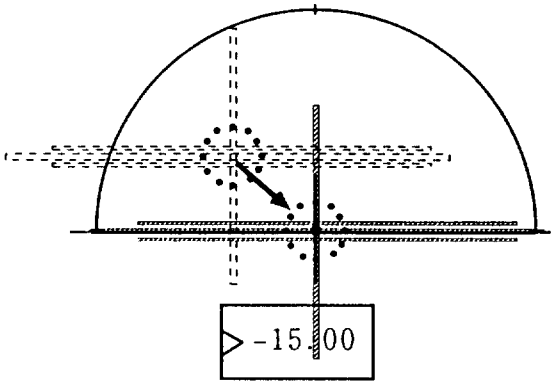
(5)Change the motor number and follow steps (3) and (4).
(R E F) → (N 1) →7 (A X) → (A C) → (A C)
Go to (3)(4)

(6)Change the motor number and follow steps (3) and (4).
(R E F) → (N 1) →8 (X C 1) → (A C) → (A C)
Go to (3)(4)

⑤ Apply Small Screw Threadlocker to each screw after the adjustments.
⑥ If you adjusted the sensors, be sure to conduct inspection and readjustment for the precision of:
8-6-5 Adjusting the optical axis (from④) .....
8-6-6 Adjusting the rotary prism accuracy.....
8-6-7 Adjusting the auto cross accuracy.....

8-6-5 Adjusting the optical axis (adjusting the position of lens plate number No.7)

① Set the main unit under the Optester table (DXA30185) to adjust the level with the level of the unit.
② Go to step ④.
③ Attach the patient's side cover and adjust the level.
④ Set the lensmater tool to -15D and align it to the measuring window.
⑤ Set the DIP SW1- No.1 to ON and then turn the unit on. A test program is executed.
⑥ Select the lens chamber to adjust (press the "Right" or "Left" key).
⑦ Set the -15D lens in the measuring window of RV.
(F 1) →1 (P D) turn the jog dial to the minus(-5 STEP)
⑧ Find the best focus on the target by adjusting the focusing handle of the lensmeter (you should have the best focus around"-15D").
⑨ Adjust the lensmeter target position to the center of reticle.

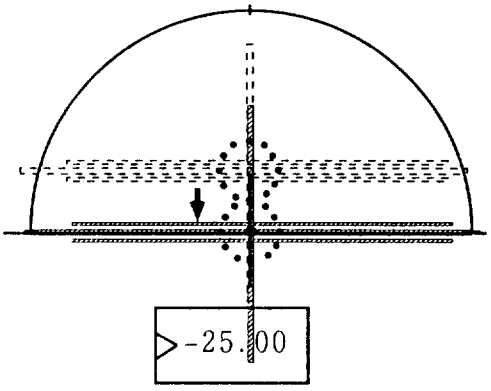


To adjust vertically:
Adjust the height of the Optester table or lensmeter.

To adjust horizontally:
Move the lensmeter right and left.

(Fig. 8-28)

⑩ Set -25D In the measuring window.
· (F 1) →7 (A X) →turn the jog dial to the plus (+4 STEP).
⑪ Find the best focus on the target by adjusting the focusing handle of the lensmeter (you should have the best focus around "-25D").



⑫ Move the green target by adjusting the compensation value with the jog dial. Adjust the compensation value so that the target gets within 0.5△.

To adjust vertically:
(R E F) →7 (A X) →turn the jog dial.

To adjust horizontally:
You do not need to adjust horizontally.

(Fig. 8-29)

⑬Store the compensation values in EEPROM.
· (R E F) → (F 2) →7 (A X) → (S E T) → (S E T)

⑭Initialize the lens plate(No7) if they are aligned properly. Standard = less than 0.5△
· (N 1) →7 (A X) → (F 1) →7 (A X) →turn the jog dial to the plus(+4 STEP)

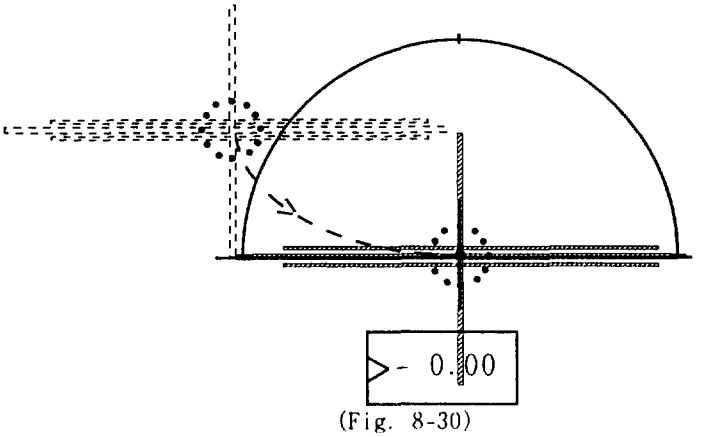
If they are aligned irregularly, go back to step ⑪.

⑮ This is the end of the procedure. If you need to adjust the auto cross, go to 8-6-6.

8-6-6 Adjusting the rotary prism accuracy

① Set the main unit under the Optester table (DXA30185) to adjust the level with the level of the unit.
② Go to step ④.
③ Attach the patient's side cover and adjust the level.
④ Set the lensmater tool to "OD" and align it to the measuring window.
Adjust the lensmeter target and the main cross line to match 180° .
⑤ Set the DIP SW1- No.1 to ON and then turn the unit on. A test program is executed.
⑥ Select the lens chamber to adjust (press the "Right" or "Left" key).
⑦ Adjust the lensmeter target position to the center of reticle.
(R E F) → (X Y ~~Δ~~ B S) → VA → (R E F) →6 (C Y L) →ジョグダイヤル

Adjust the target position to the center by 1 step (see Figure 8-30).

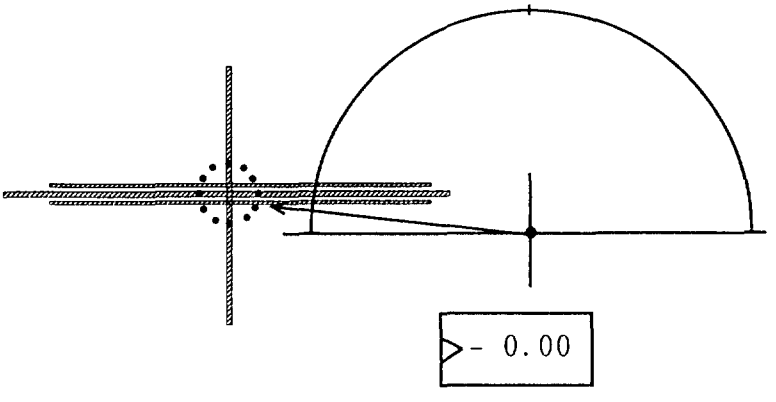


(Fig. 8-30)

⑧ Initialize after the adjustment.
(N 1) →6 (C Y L)

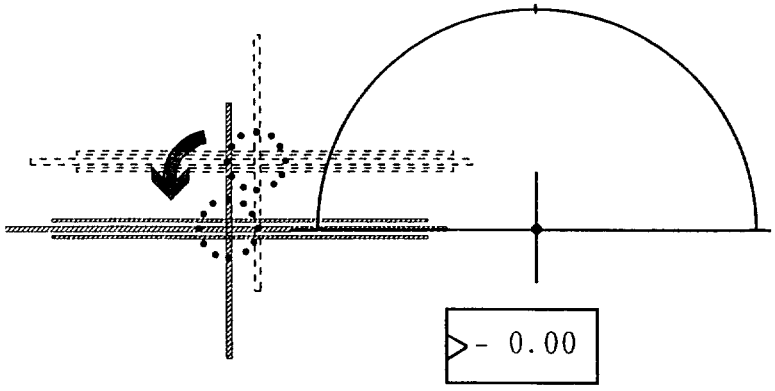
⑨ Adjust the prism angle.
(R E F) → (X Y ~~Δ~~ B S) → VA press"VA" six times :

"-500" is displayed on the CYL display. The target is moved to the left (see Figure 8-31).



(Fig. 8-31)

⑩ Adjust the target vertically by turning the jog dial (adjusting the compensation value).

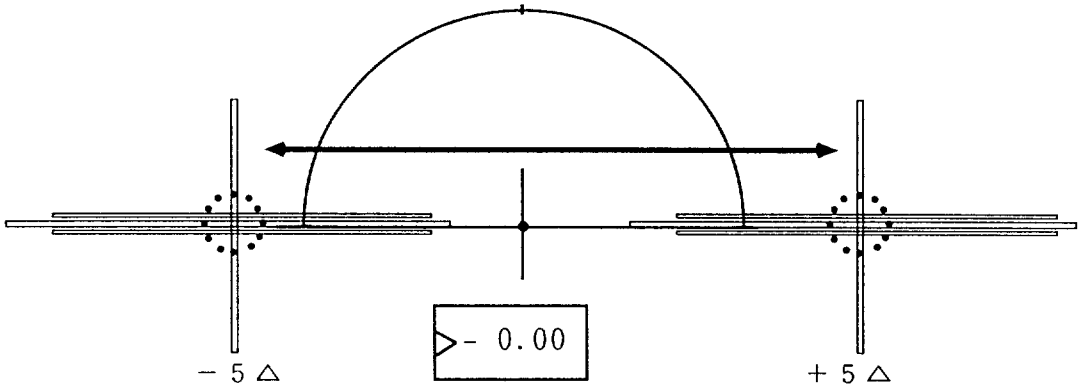


(Fig. 8-32)

⑪ VA press"VA" ten times···"+500" is displayed on the CYL display.

· Adjust the target position by turning the jog dial so that it is in the same position every time you move it right or left(+5△←→-5△).

Limit of tolerances = It should be less than 0.25△ at +5△, -5△, and 0△.



(Fig. 8-33)

⑫ Store the compensation value into EEPROM.

· To initialize, press the (N 1) →6 (C Y L) →8 (X C 1)

· To store, press the (F 2) →6 (C Y L) → (S E T) (S E T)
→8 (X C 1) → (S E T) (S E T)

⑬ Check the accuracy.

· Initialize the unit once in the normal mode, and then press the horizontal prism keys (◁▷).

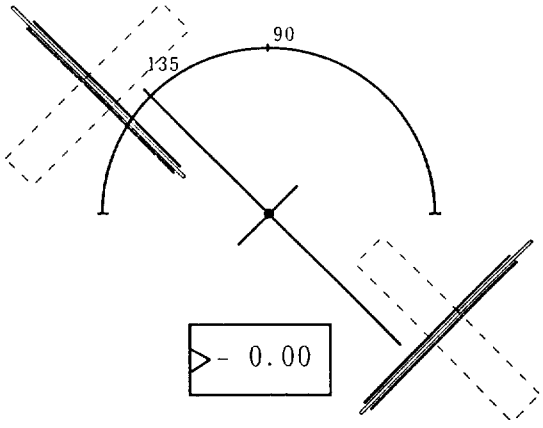
· When the lensmeter is set to 0DP; The target position should be less than 0.25△. The target position should be less than 0.25△ both at 5△BI and 5△BO.

If the position is out of the standard range, go back to step ③to readjust.

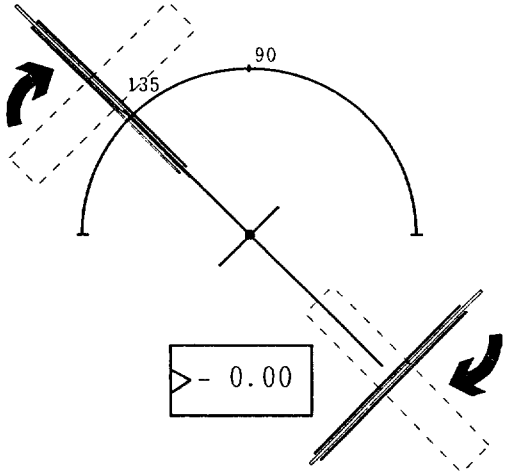
⑭ This is the end of the adjusting procedure. If you need to adjust the auto cross, go to 8-6-7.

8-6-7 Adjusting the auto cross accuracy

① Set the main unit under the Optester table (DXA30185) to adjust the level of the unit.
② Go to step ④.
③ Attach the patient's side cover and adjust the level.
④ Set the lensmater tool to "OD" and align it to the measuring window.
Adjust the lensmeter target and the main cross line to match 135° .
⑤ Set the DIP SW1- No.1 to ON and then turn the unit on. A test program is executed.
⑥ Select the lens chamber to adjust (press the "Right" or "Left" key).
⑦ Initialize all of the right or left motors.
(R E F) → (N 1) → (○)
⑧ Set an auto cross lens in the measuring window.
(R E F) → (F 1) →7 (A X) →turn the jog dial to the left(+1 STEP)
⑨ Initialize the auto cross lens. You should have the best focus of the top left target toward 135° . (See Figure 8-34)
(R E F) → (N 1) →11 (X C 2)
⑩ Adjust the lensmeter target position toward 135° with pulse mode. (Figure 8-35)
(R E F) →11 (X C 2) →turn the jog dial



(Fig. 8-34)



(Fig. 8-35)

⑪ Store the compensation values in EEPROM..
(R E F) → (F 2) →11 (X C 2) → (S E T) (S E T)

⑫ Check if the precision meets the standard.
- Set the DIP SW1- No.1 to OFF and then turn the unit on to start in the normal mode.
- Adjust the lensmeter target and the main cross line to match 180° .
- Initialize the unit once in the normal mode, and then press the "Right" or "Left" key.
- Set in the auto cross mode by pressing the "AUTO" and then "CYL" keys.
- You will see two green targets. Focus on them for -0.25D (R) and +0.25D (L) in turn.

Standard = The two green targets should be within 180° ±3° (see Figure 8-21).
If they are not, go back to step ③.

⑬ This is the end of the procedure. Go to 8-7 Automatic Continuous Rotation mode.

8－7 Automatic Continuous Rotation mode
(checking gear mesh)

① Set the main unit under the Optester table (DXA30185) to adjust the level with the level of the unit.
② Go to step ④.
③ Attach the patient's side cover and adjust the level.
④ Check the accuracy for both right and left measuring windows with the lensmeter tool.
- Set the DIP SW1-No1,No.2 to ON and turn the unit on. A test program is started.
- Make it sure that cylindrical lens power, cylindrical axis , prism power, prism angle, auto cross axis , and the optical axis of lens plate No.1 and No7 are adjusted to meet the standards.

⑤ Remove the lensmeter tool so that it should not touch other parts during the Automatic Continuous Rotation mode
⑥ Turn the unit off then turn back on. Restart the test program to initialize it.
⑦ Execute the Continuous operation test.
(N 2) → (P 1) (see 5-3 Test Program 7.)

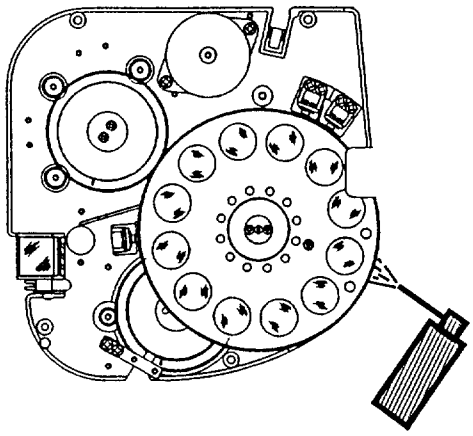
Automatic Continuous Rotation mode repeats 30 test cycles, in which motors run 10 seconds and rest 50 seconds per cycle, for 30 minutes

⑧ Each lens plate, convergence, and PD part operate smoothly during the test.
⑨ Inspect the optical parts with the lensmeter tool after the test.
⑩ Set the all DIP SW settings to OFF.

9 Cleaning Optical Parts

9－1 Cleaning the inside of Lens

(Rotary Prism and Rotary Cylinder)



(Fig. 9-1)

9-1-1 If there is dust on the inside of lens: (rotary prism and rotary cylinder)

① Remove the display and lens chamber covers (see 6-1 and 6-2).

② Turn the unit on in the normal mode.

③ Remove the dust by blowing air into the gap with a blower that has an extension tube. (See Figure 9-1)

9-1-2 If there is a stain or mold in the inside of lens. (rotary prism and rotary cylinder);

For rotary prism:

- Remove the display and lens chamber covers (see 6-1 and 6-2).
- Prepare the lensmeter tool on hand.
- Turn the unit on to initialize it.
- Set a prism in the measuring window with the remote controller.
- Mark on the rotary prism frame with a pencil and remove the prism to clean it.
- Reset the rotary prism frame by matching the mark. Check the rotary prism accuracy, referring 8-6-1.

For rotary cylinder:

- Remove the display and lens chamber covers (see 6-1 and 6-2).
- Remove the rotary cylinder to clean it, referring 8-4-2.

9－2 Cleaning Optical Parts of Lens Plate

- Cleaning them with the lens chamber cover attached (cleaning the lens surface of the patient's side)

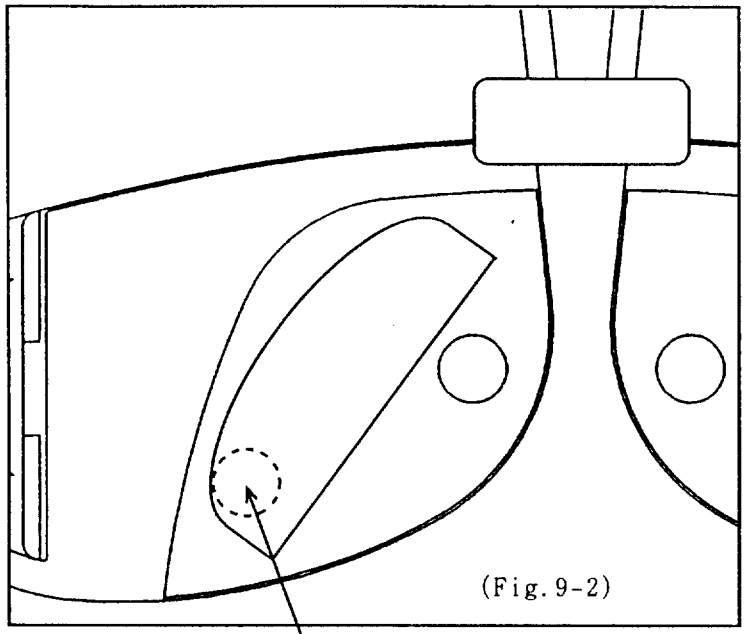
① Start a test program in the normal mode to keep the current compensation values.
(SET) → (AC) → (NEXT) → (BACK) → (SET)

② Select a lens chamber by pressing the "Right" or "Left" key.

③ Change the lens in the lens frame mode. Check if there is dust, a stain, or mold on the surface of each lens by visual inspection. Be sure to inspect from the patient's side.

(F1) →1 (PD) →turn the jog dial.
(F1) →2 (ADD) →turn the jog dial.
(F1) →3 (◁▷) →turn the jog dial.
(F1) →7 (AX) →turn the jog dial.

④ If you find dust, remove the cheek rest and peel off the rubber plate for cleaning window .



(Fig.9-2)

You will see the lens cleaning window behind the rubber plate.

⑤ If you find a stain or mold, set in the lens cleaning mode. (F 1) → (○)

Note: If gears obstruct you from wiping the lens, adjust the position of the cleaning window by moving it in the pulse mode.

To adjust the cleaning window, (R E F) →4 (△▽) →turn the jog dial.
- Wipe the stain or mold through the cleaning window.
- Reset the cleaned lenses to the measuring window.→ (○)

If you find dust, a stain, or mold on the examiner's side surface of a lens.
① Remove the display and lens chamber covers (see 6-1 and 6-2 for the details).
② Start a test program in the normal mode to keep the current compensation values.
(S E T) → (A C) → (N E X T) → (B A C K) → (S E T)
③ Select a lens chamber by pressing the "Right" or "Left" key.
④ Change the lens in the lens frame mode. Check if there is dust, a stain, or mold on the surface of each lens by visual inspection. Be sure to inspect from the patient's side.
(F 1) →1 (P D) →turn the jog dial.
(F 1) →2 (A D D) →turn the jog dial.
(F 1) →3 (◁▷) →turn the jog dial.
(F 1) →7 (A X) →turn the jog dial.

⑤ If you find dust, a stain, or mold;
For dust: Clean the patient's side surface of the lens plate (No.1,2,3) through the open frame of each lens plate.

Clean the patient's side surface of the lens plate (No.1,2,3) and the lens plate (No.7) by blowing air into the gap between them with a blower that has an extension tube (see Figure 9-1).

For stains or mold:

- Clean the patient's side surface of the lens plate (No.1,2,3) through the open frame of each lens plate.
- To clean the patient's side surface of the lens plate (No.1,2,3) and the lens plate (No.7), press the lens cleaning mode key to do it through the cleaning window.

Lens cleaning mode

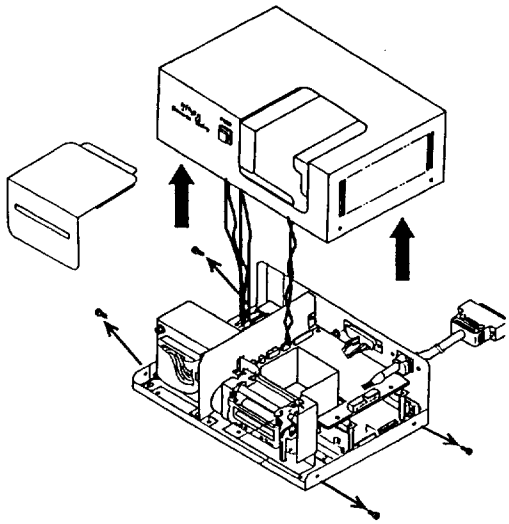
- Start a test program.
- Select a lens chamber by pressing the "Right" or "Left" key.
- Inspect the lenses in the frame mode as described in step ④.
- If you find stain or mold, set in the lens cleaning mode. (F1) → (○)
- Align the hole positions for cleaning (REF) →4 (△▽) →turn the jog dial. turning the jog dial if necessary.

- Wipe the stains or mold through the cleaning window.
- Set the cleaned lenses to the measuring window. → (○)

10 Power Supply

10-1 Removing the Power Supply Cover

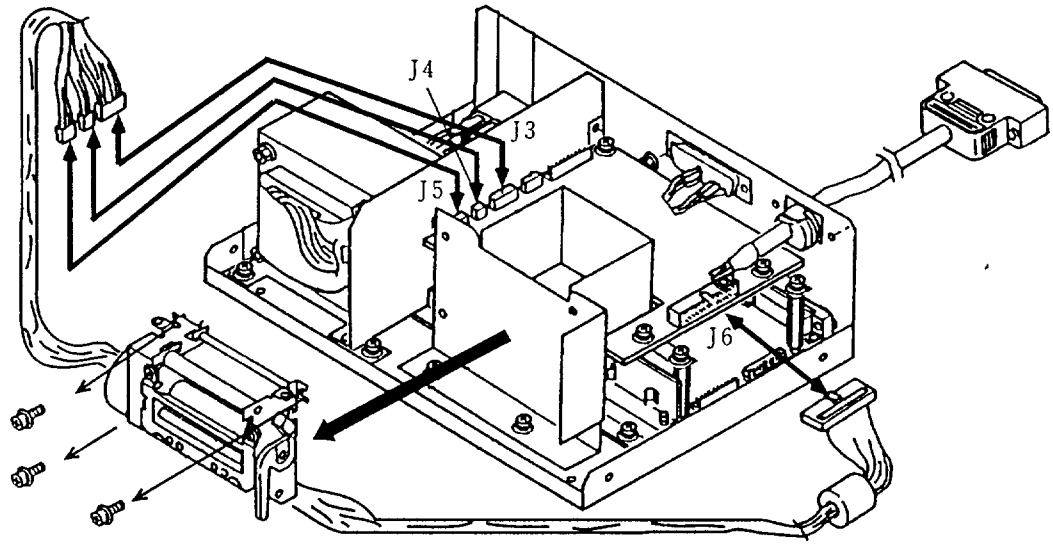
① Unplug the power cord from the outlet.
② Remove the printer cover and remove the 4 screws.
③ Remove the power control unit cover upward.



(Fig10-1)

10-2 Replacing the Printer

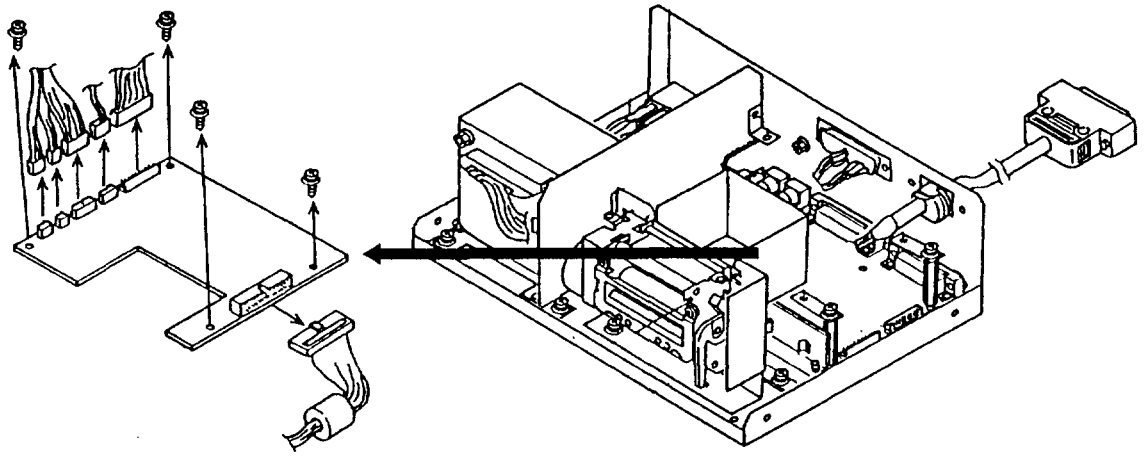
① Unplug the power cord from an outlet.
② Remove the power supply cover, referring "10-1 Removing the Power Supply Cover".
③ Removing the three screws and disconnecting the printer connector enables you to remove the printer.



(Fig 10-2)

10-3 Replacing the Printer Board

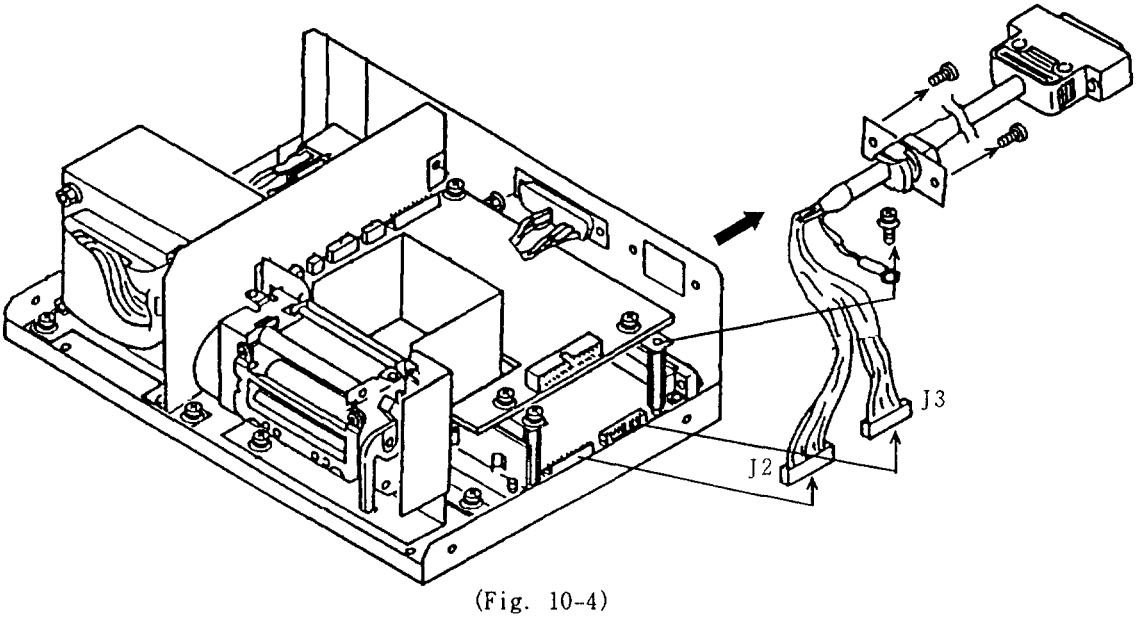
① Unplug the power cord from the outlet.
② Remove the power supply cover, referring "10-1 Removing the Power Supply Cover".
③ Remove the four screws and disconnect all connectors (J1-J6). This allows you to remove the printer board.
④ Replace it with a new one. Set all DIP SW settings to "OFF" on the printer board.
⑤ Assemble the unit in the reverse order of disassembly.
⑥ Turn the unit on to start it in the normal measuring mode.
⑦ Press the print key to test printing.
⑧ If the printer does not print normally, see "4-1 Trouble-shooting⑫".



(Fig. 10-3)

10－4 Replacing the Lens Chamber Connection Cable

① Unplug the power cord from the outlet.
② Remove the power supply cover, referring "10-1 Removing the Power Supply Cover".
③ Disconnect the connector and the round terminal. Unscrew the two set screws that hold the cables.
④ Replace the cables with new ones.
⑤ Assemble the unit in the reverse order of disassembly.
⑥ Turn the unit on to start it in the normal measuring mode.
⑦ Press the print key to test printing.
⑧ If the printer does not print normally, see "4-1 Trouble-shooting⑫".



(Fig. 10-4)

10－5 Table of Adjusting VR in the Power Supply

① Adjusting the VR on the power source board
VR1: Adjusts the power supply as driving power in the lens chamber.
Standard: 16±0.1 (DC) (See Figure 10-6.)

Note: When you inspect the gear mesh, set the power supply to 13V. Be sure to reset the power supply to 16V after the inspection.

How to adjust:
1) Disconnect the lens chamber connection cable from the lens chamber.
2) Remove the power supply cover, referring "10-1".
3) If the printer is built in, remove the printer board, referring "10-3 Replacing the Printer Board".
4) Turn the unit on. Measure the voltage between "TP1" and "TP2" on the power source board with a Digital multi-meter to check if the voltage meets the standard (see Figure 10-6).
5) If it does not meet the standard, adjust the VR1 (see Figure 10-6).

② Adjusting VR on the printer board
VR1: Adjusts the density of printing. Adjust it to the middle of the adjusting range (see Figure 10-5).

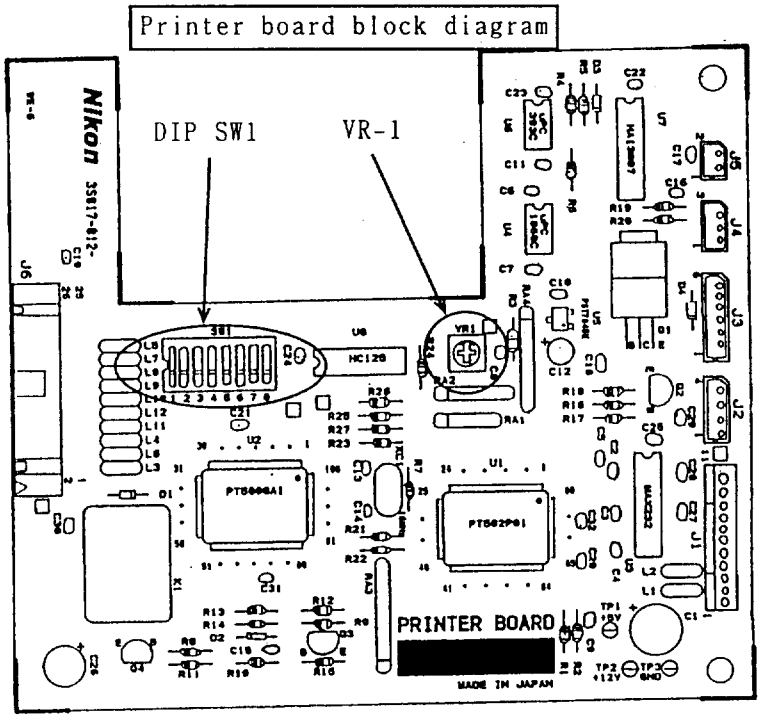
10－6 Table of DIP SW Settings in the Power supply

① DIP SW1 on the printer board (see Figure 10-5)

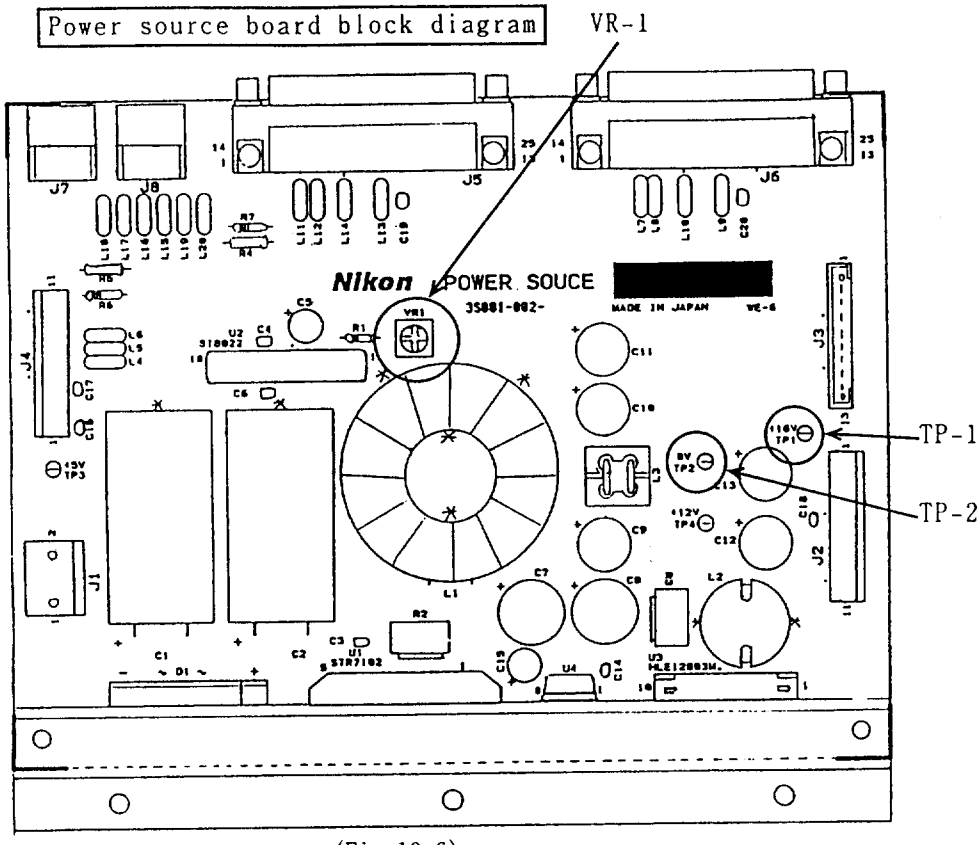
No.1	Interface mode	(Default=OFF)
No.2	Allowing to specify the maximum dot number in the dynamic division	(Default=OFF)
No.3	Allowing to specify the maximum dot number in the dynamic division	(Default=OFF)
No.4	Allowing to specify the maximum dot number in the dynamic division	(Default=OFF)
No.5	Selecting of printing method	(Default=OFF)
No.6	Selecting the maximum printing speed	(Default=OFF)
No.7	Selecting the feeding speed	(Default=OFF)
No.8	Not used	(Default=OFF)

Note: You do not need to use this DIP SW for repairing or adjusting. Be sure to set all SW settings to "OFF".

Printer board block diagram



(Fig 10-5)


Power source board block diagram
VR-1
TP-1
TP-2
Nikon
POWER SOUCE
MADE IN JAPAN

(Fig 10-6)

11 Password Table and Printouts

11-1 How to Start a Test Program and Printouts for Compensation Values

(See 5-1 from Page 15 for Details)

- Purpose : To start a test program without using DIP SW
- Procedure: ① Power up the main unit or press (AC) → (AC) to initialize the unit.
  ② Enter as follows with the remote controller (password):
  [SET] → [AC] → [NEXT] → [BACK] → [SET]

- To print out compensation values: Press the print key after a test program is started (see Page 23) .

11-2 How to Start Quick Setup (see 12-1 on Page 75)

- Purpose: To reset the initial settings to default according to the sales area.
- Procedure: ① Power up the main unit or press (AC) → (AC) to initialize the unit.
  ② Enter as follows with the remote controller (password):
  [STEP] → [BACK] → [STEP] → [BACK] → [STEP]

11-3 How to Start the Initial Settings and Printouts for Set Values

(See 12-2 on Page 76 for the Details)

- Purpose: To customize the initial settings of the unit based on the user preferences
- Procedure: ① Power up the main unit or press (AC) → (AC) to initialize the unit.
  ② Enter as follows with the remote controller (password):
  [NEXT] → [BACK] → [NEXT] → [STEP]

- To print out set values: Press the print key after a test program is started.
  (see Figure 11-2 on Page 23).

11-4 How to Print Out the Set Values for the Eye Examination Program

(See Figure 11-2 on Page 74).

Procedure: ① Start the unit in the normal measuring mode.
② [SET] → [Program number] → [PRINT]
(1) (2) (3)

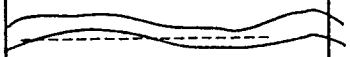
Compensation value

```
7. 5.'97 17:15

MAIN:Ver 1.20
SUB :Ver 1.20
TYPE:Export
=== Test Data ===
-------
 Right
-------
No.  1 +0569(0239H)
No.  2 +0569(0239H)
No.  3 +0567(0237H)
No.  4 +0004(0004H)*1
No.  5 +0006(0006H)*2
No.  6 +0217(00D9H)*3
No.  7 +0568(0238H)*1
No.  8 +0299(012BH)*1
No.  9 +0259(0103H)
No. 10 -0004(FFFCH)
No. 11 +0358(0166H)
-------
 Left
-------
No.  1 +0567(0237H)
No.  2 +0568(0238H)
No.  3 +0570(023AH)
No.  4 +0054(0036H)*2
No.  5 +0065(0041H)*2
No.  6 +0309(0135H)*0
No.  7 +0566(0236H)*2
No.  8 +0359(0167H)*3
No.  9 +0229(00E5H)
No. 10 -0014(FFF2H)
No. 11 +0338(0152H)
```

(Fig. 11-1)

Program examination data list

```
==================
PROG No.3
(NP34)
==================
------------------
 STEP:1
 CHART:SNELLEN 1.0
 KEY:R&L
 KEY:SPH
 KEY:REF

------------------
 STEP:2
 CHART:R/G
 KEY:RIGHT
 KEY:SPH

------------------
 STEP:3
 CHART:XC-DOTS
 KEY:RIGHT
 KEY:AX
 KEY:XCAUTO

------------------
 STEP:4
 CHART:XC-DOTS
 KEY:RIGHT
 KEY:CYL
 KEY:XCAUTO

------------------
 STEP:5
 CHART:R/G
 KEY:RIGHT
 KEY:SPH
 KEY:OFF

------------------
 STEP:6
 CHART:SNELLEN 1.0
 KEY:RIGHT
 KEY:SPH
```



```
 STEP:12
 CHART:SNELLEN 1.0
 KEY:R&L
 KEY:SPH
```

(Fig. 11-2)

Initial values

```
[SET UP DATA]

1.Time set
  (1)print Date :D.M.Y
  (2)print Time :24H
  (3)Time :
       7. 5.'97 17:35

2.Initial set
  (1)print Out :Sbj
  (2)auto Sph :on
  (3)PD :SPLIT
  (4)VD :12.0
  (5)retino :1.5D
  (6)XC :Auto
  (7)XC C/A :Ax
  (8)XC Value :0.25D
  (9)VA :1.0
 (10)PRESET H :10BI
 (11)PRESET V : 6BU
 (12)XC Exit :Auto

3.Communication set
  (1)Chart Model :NP34
  (2)Printer :in
  (3)VA Link :on
  (4)Chart ID :1
  (5)CH1 :NNKE
  (8)CH1 Speed :9600
  (7)CH1 Out :off
  (8)CH2 :NK
  (9)CH2 Speed :9600
 (10)CH2 Out :off
 (11)Data in :ONE
 (12)Retinomax ID :1
 (13)R.C ID :1
```

(Fig. 11-3)

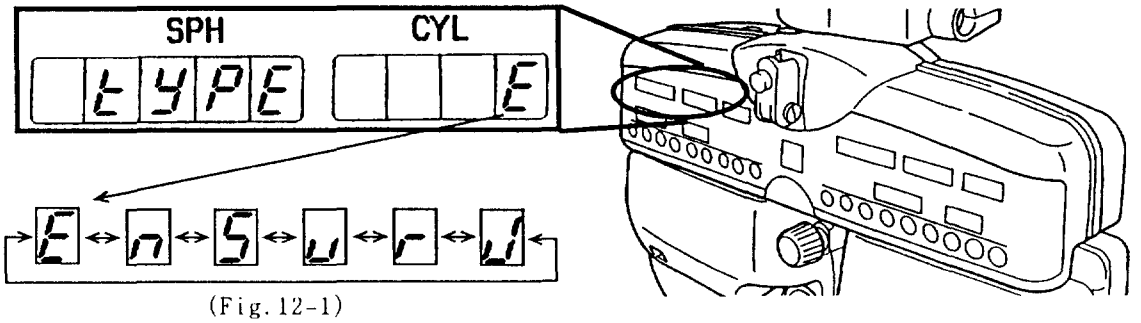
12 Initial Setup and Communication Setup

12－1 Quick Setup

Purpose: To reset the initial settings to the default values according to the sales area

Procedure: ①Turn the unit off then turn back on or press [AC] → [AC] to initialize the unit.
②Enter as follows with the remote controller (password):
[STEP] → [BACK] → [STEP] → [BACK] → [STEP]
③The display for the right lens chamber will look like Figure 12-1.
④Select the sales area by turning the jog dial (see Table 12-1, Table of Default Settings Classified by Sales Area for details).
⑤If you press [STEP] → [STEP] after the area selection, the default values are automatically set according to the area.

Note: To return to the normal mode without setting the default values, press the [NEXT] key.



(Fig. 12-1)

Table of Default Settings Classified by Sales Area

DISPLAY	Setting chart		DATE FORM	TIME FORM	VD	PD	SALES AREA
E	Europe II	(nP34)	D/M/Y	24H	12.00	SPRIT	Europe
n	Numbers	(nP33)	M/D/Y	24H	12.00	RL	KOREA, TAIWAN Asia
S	Snellen	(nP35)	D/M/Y	24H	12.00	RL	Europe
U	Multiple USA	(nP32)	M/D/Y	12H	13.75	RL	USA
r	None/R.V.only	(OFF)	D/M/Y	24H	12.00	SPRIT	Europe
J	NC-7	(nc7)	Y/M/D	12H	12.00	RL	Japan

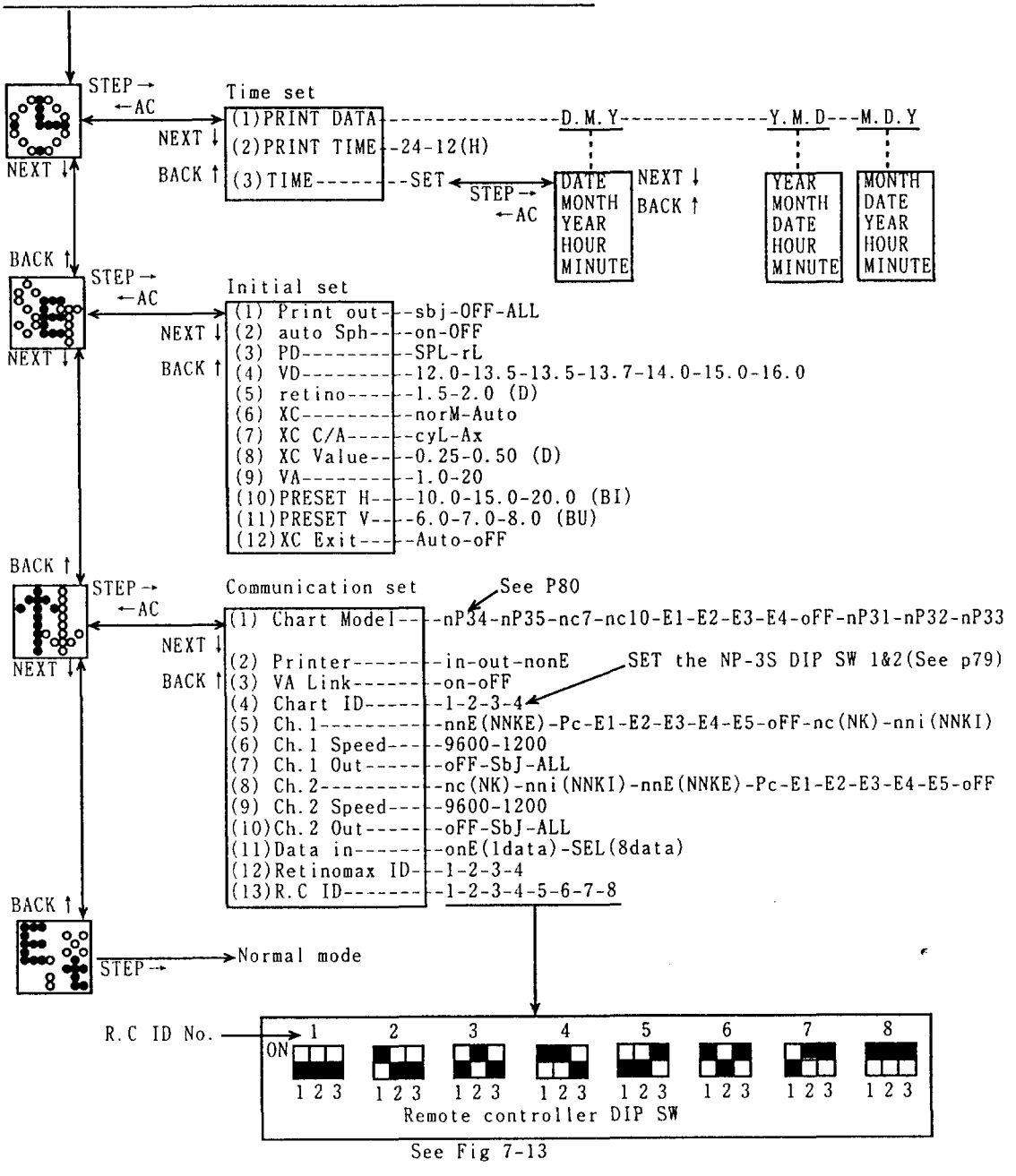
(Table 12-1)

12－2 Initial Settings Table

For details, see the Instructions.

Initial Settings Table Press the "PRINT" key to print the set values.

Password : NEXT→BACK→NEXT→STEP



See Fig 7-13

12-3 Printing Out the Set Values

①Password: Press (NEXT)→(BACK)→(NEXT)→(STEP) to set in the initial setting mode.
②Press the "PRINT" key of the remote controller, the initial set values are printed out (see Figure 11-3 on Page 74).

12-4 Standard Communication Setup

12-4-1 Retinomax and Retinomax K-PLUS

①Both Retinomax and Retinomax K-PLUS use infrared communication, so you do not need any cable connection. Setup up the infrared communication as follows:

For the initial setup for Retinomax:
Turn the unit on while holding down the "QUICK" key displays the initial setup screen.
- Note the set value of UNIT NO.
  MENU OUTPUT→OUTPUT→UNIT NO "?"
- Select the OUTPUT option on the MENU OUTPUT menu and change the value of the PRT CONTROL to "PRINT SEND" or "SEND ONLY".

For the initial setup for Retinomax K-PLUS:
Turn the unit on while holding down the "MODE" key displays the initial setup screen.
- Note the set value of UNIT NO.
  MENU OUTPUT→OUTPUT→UNIT NO "?"
- Select the OUTPUT option on the MENU OUTPUT menu and change the value of the PRT RS OUT to "REF" or "REF/KER".

②Make sure the Communication Set - (12) Retinomax ID of the RV is the same as the UNIT ID in the Retinomax series. If it is not, change it to the same number (see Initial Settings Table on Page 76).

③Press the "AC" key twice of the remote controller.
Pressing the "PRINT" key of the Retinomax targeting the lens chamber of the RV after the measurements with the Retinomax transmits the data from the Retinomax to the RV.

12-4-2 NRK8000, NR5500, and NR5100

①Prepare an interface cord from DDB20204 (3m), DDB20205 (1m), or DDB20206 (10m) on hand.
Set the selector switches at both ends of the cord to "NNK".
Connect the auto refractometer and the CH1 connector of the RV with the interface cord.
②Set the RS232C in the initial setup menu of the auto refractometer to "NNKE".

(MENU)→(SYS SET)→Dip sw No5 ON→(PRE SET)→ RS232C = NNKE

③Set the Communication Set-(5)Ch.1 in the initial setup of the Remote Vision to "nnE"(NNKE).
The transmission speed for the communication is automatically selected (see Page 76).
④Pressing the "PRINT" key of the auto refractometer transmits the data to the RV after measurement with the auto reflex.

12-4-3 NR5000 and NR7000

①Prepare an interface cord from DDB20204 (3m), DDB20205 (1m), or DDB20206 (10m) on hand.
Set the selector switches at both ends of the cord to "NK".
Connect the auto refractometer and the CH1 connector of the RV with the interface cord.
②Set the DIP SW No.7 of auto refractometer to "ON" to set in the RS232C mode.
③Set the Communication Set-(5)Ch.1 in the initial setup of the Remote Vision to "nc"(NK).
The transmission speed for the communication is automatically selected.
④Pressing the "PRINT" key of the auto refractometer transmits the data to the RV after measurement with the auto refractometer.

12-4-4 NL-2 and NL-30

①Prepare as interface cord from DDB20204 (3m), DDB20205 (1m), or DDB20206 (10m) on hand.
Set the selector switches at the both end of the cord to "NK".
Connect the auto lensmeter and the CH2 connector of the RV with the interface cord.

②NL 2: Set the DIP SW No. 7 to "OFF".
NL30: Setting up the interface
How to select: Turn the unit on, while the Nikon logo mark is being displayed in reverse, press the "MEMORY" key until the selection screen shows.
Press the "SET" key to display the selection screen.
Select the "SEND" or "PRINT AND SEND" icon.

③Setting up the communication port
How to select: Turn the unit on, while the Nikon logo mark is being displayed in reverse, press the "MEMORY" key until the selection screen shows.
Press the "SD" key to display the selection screen.
BAUDRATE = 1200
PARITY BIT= NONE
STOP BIT = 2 BIT
CHARACTER = 8 BIT

④Set the Communication Set - (8)CH2 in the initial setup of the Remote Vision to "nc"(NK).
The transmission speed for the communication is automatically selected.
⑤Pressing the "PRINT" key of the auto lensmeter transmits the data to the RV after measurement with the auto lensmeter.

12-4-5 TOMEY TL1000 and TL900

①Connect the TOMEY lensmeter and the CH2 connector of the RV with the special communication cable from Tomey.
②The TOMEY lensmeter does not require special settings.
③Set the Communication Set - (8)CH2 in the initial setup of the Remote Vision to "E1".
The transmission speed for the communication is automatically selected.
④Pressing the "PRINT" key of the auto lensmeter transmits the data to the RV after measurement with the lensmeter.

Caution: TL900 communication, Supported by Main ROM Ver. 1.30 or later.

12-5 NP-3S DIP SW Settings Table

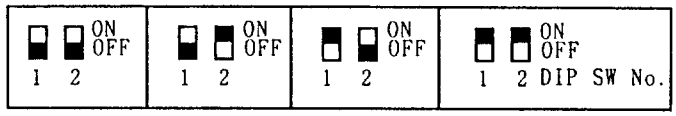
NP-3S DIP SW Settings Table

DIP SW 1 & 2

Preventing interference with remote communication

Remote Vision ←→Chart

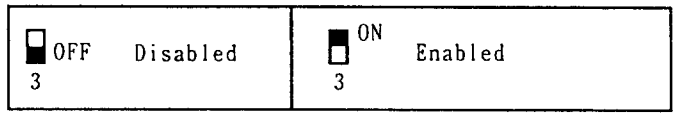
Setting eye-test chart number (chart ID) ⟶ 1 2 3 4



(See 12-2 Initial Settings Table)

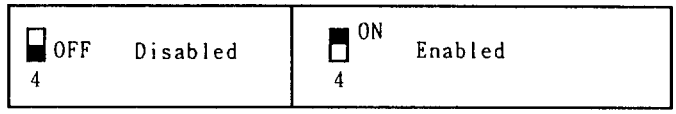
DIP SW 3

Speaker



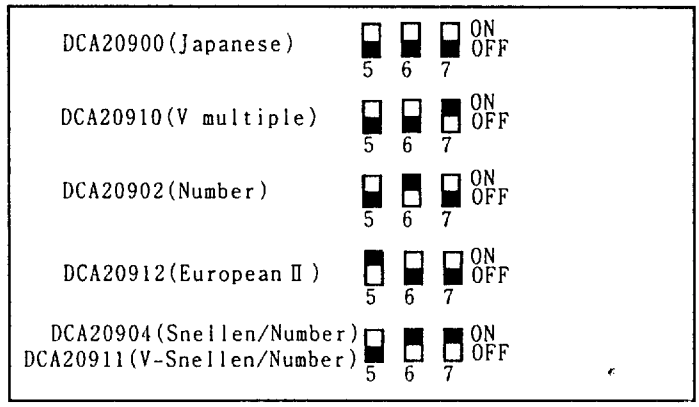
DIP SW 4

Backup batteries SW



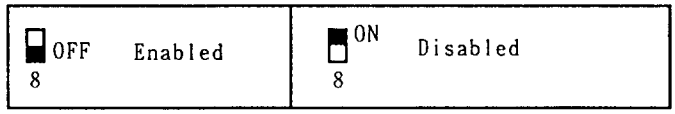
DIP SW 5 & 6 & 7

Setting chart type

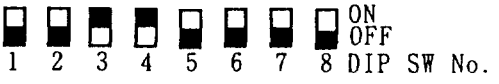
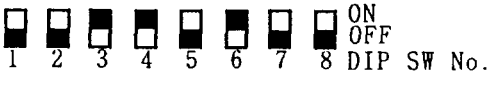


DIP SW 8

Setting the power saving mode of the projection lamp

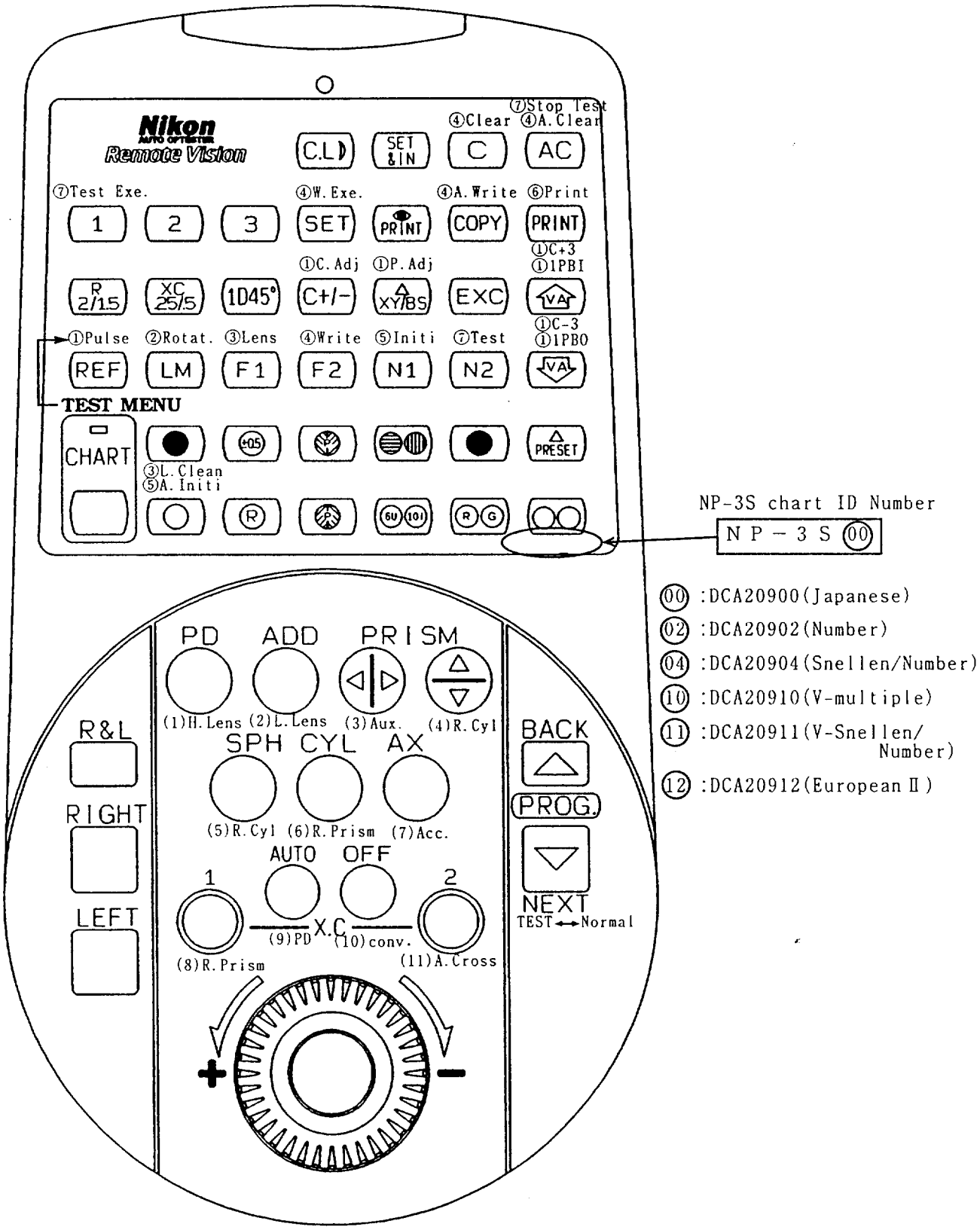


NP-3 DIP SW Default Settings Table

Chart type	Setting RV eye-test chart	NP-3S DIP SW
DCA20900(Japanese)	nP31	
DCA20910(V-multiple)	nP32	
DCA20902(Number)	nP33	
DCA20912(European Ⅱ)	nP34	
DCA20904(Snellen/Number) DCA20911(V-Snellen/Number)	nP35	

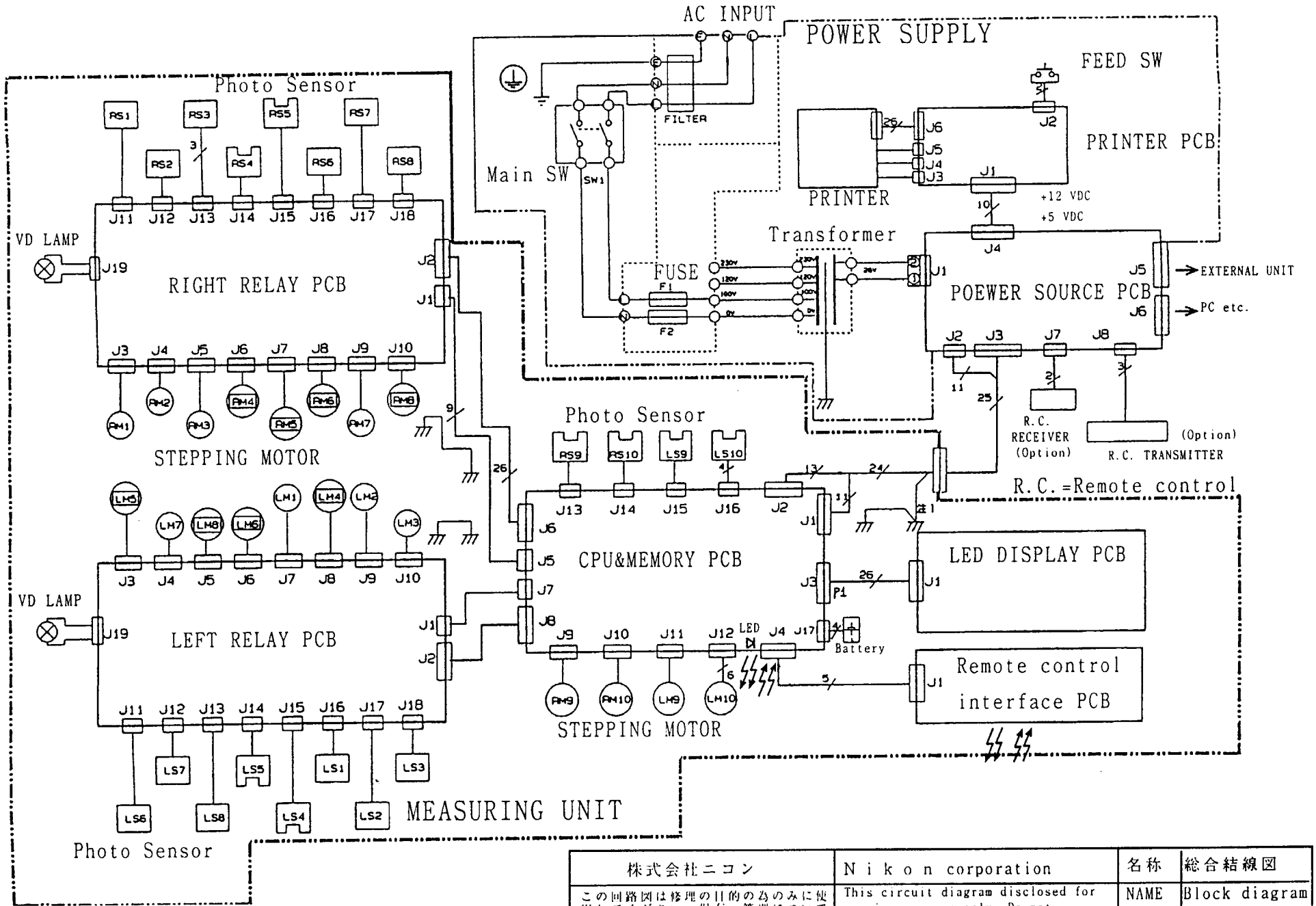
ON
OFF
1 2 3 4 5 6 7 8 DIP SW No.

Remarks: You can use DCA20903 (Snellen), which is no longer sold, by setting as DCA20902.

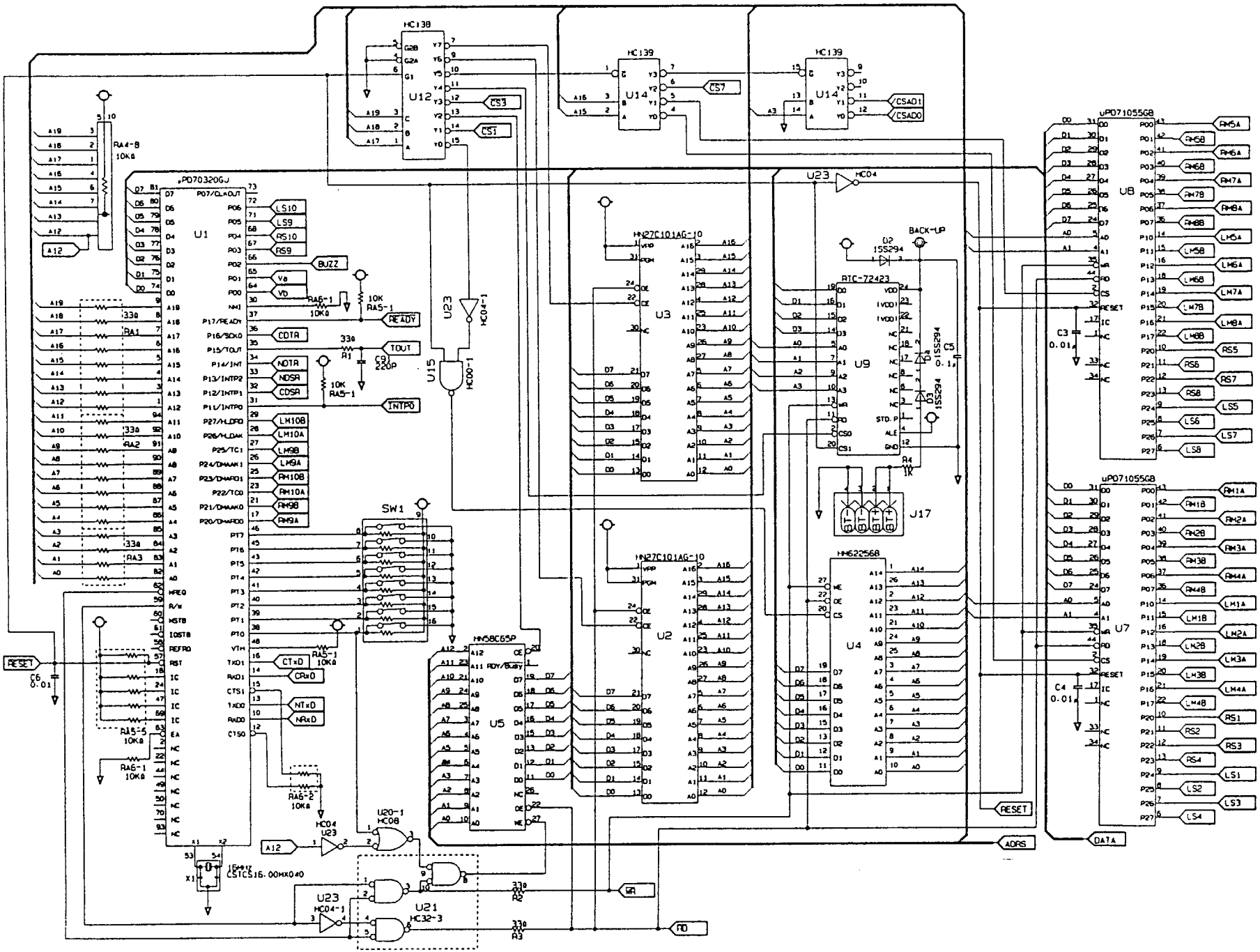


00 :DCA20900(Japanese)
02 :DCA20902(Number)
04 :DCA20904(Snellen/Number)
10 :DCA20910(V-multiple)
11 :DCA20911(V-Snellen/Number)
12 :DCA20912(European Ⅱ)

Full-size Diagram



株式会社ニコン	Nikon corporation	名称	総合結線図
この回路図は修理の目的の為のみに使用してください。保存、管理については十分注意され、他の目的の為にコピー、配布を行わない様、お願いします。	This circuit diagram disclosed for repair purposes only. Do not duplicate and distribute for other purposes, taking special care for the strage.	NAME	Block diagram
		Remote Vision	



株式会社ニコン	Nikon corporation	名称	CPU基板
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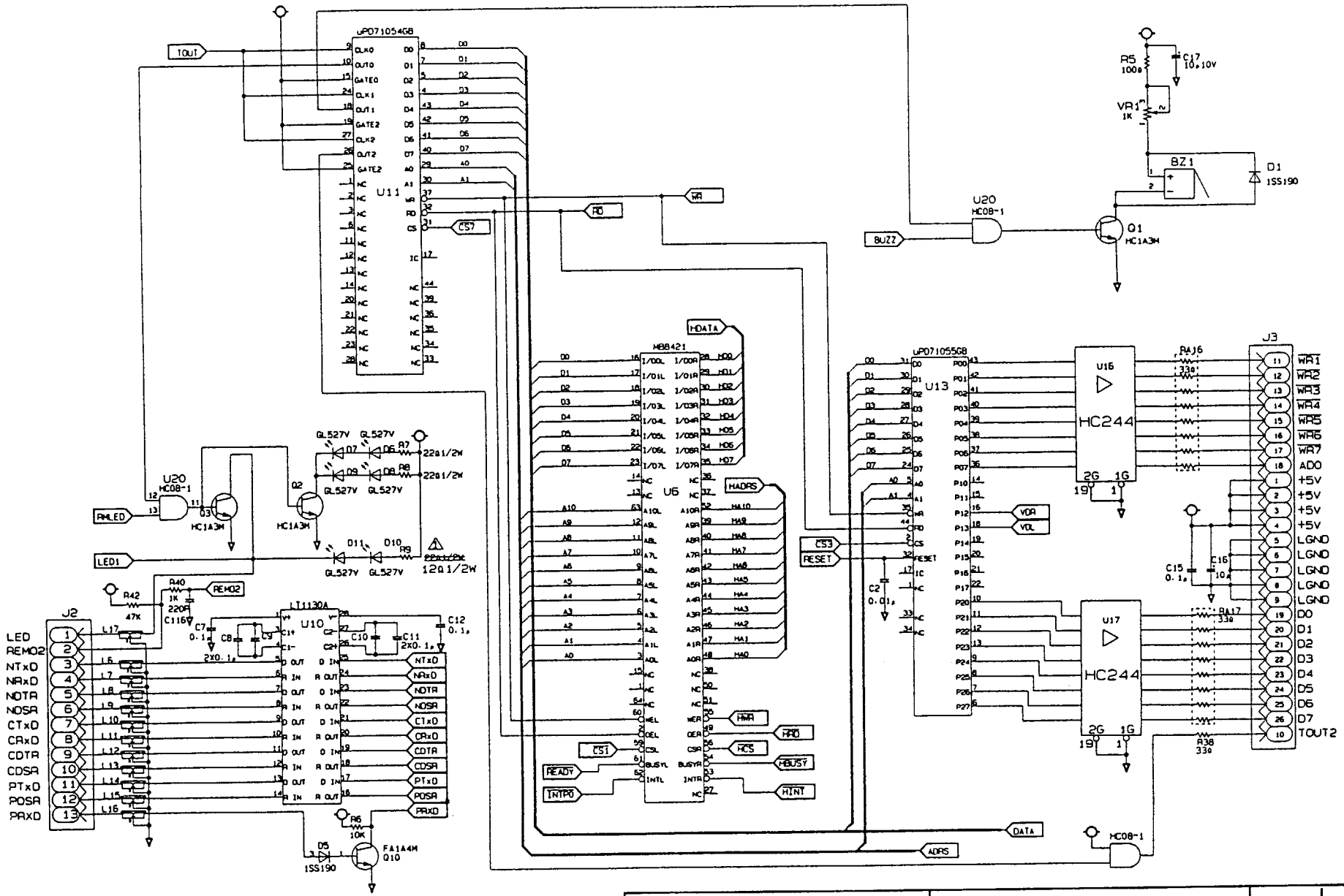
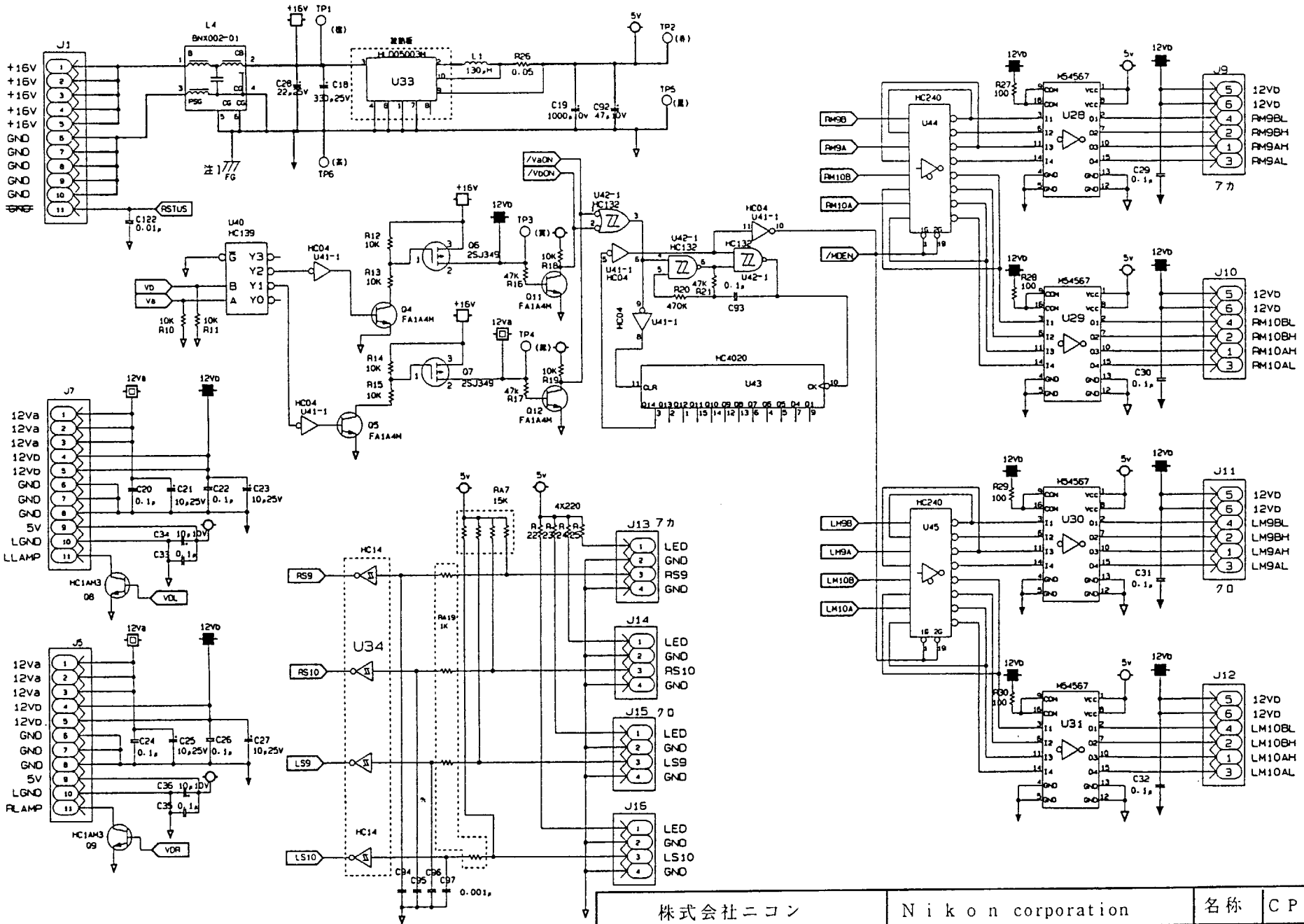
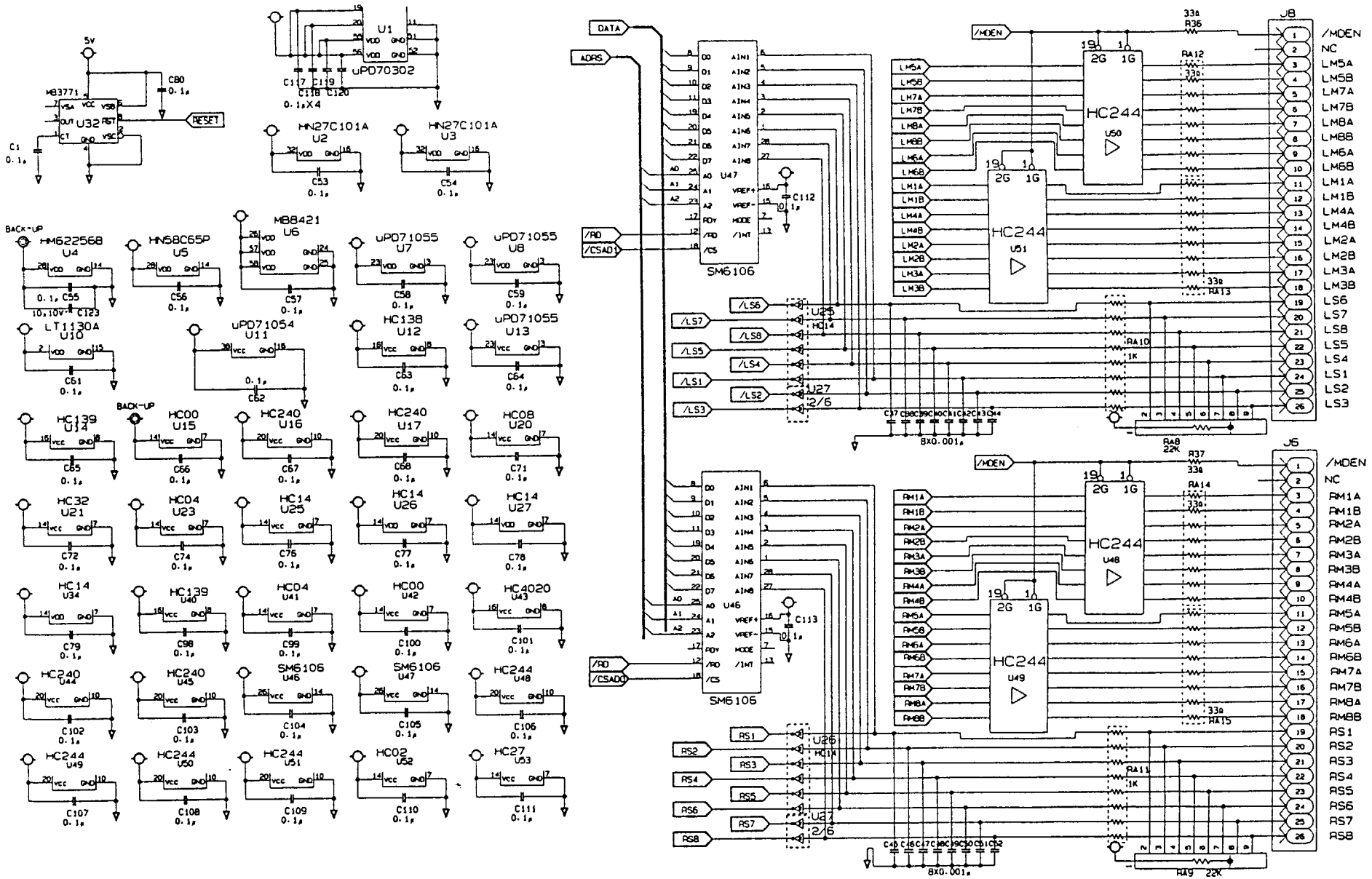
			Remote Vision



株式会社ニコン	Nikon corporation	名称	CPU基板
この回路図は修理の目的の為のみに使用してください。保存、管理については十分注意され、他の目的の為にコピー、配布を行わない様、お願いします。	This circuit diagram disclosed for repair purposes only. Do not duplicate and distribute for other purposes taking special care for the strage.	NAME	CPU BOARD 2/5
			Remote Vision



株式会社ニコン	Nikon corporation	名称	CPU基板
この回路図は修理の目的の為のみに使用してください。保存、管理については十分注意され、他の目的の為にコピー、配布を行わない様、お願いします。	This circuit diagram disclosed for repair purposes only. Do not duplicate and distribute for other purposes taking special care for the strage.	NAME	CPU BOARD 3/5
			Remote Vision



株式会社ニコン	Ｎｉｋｏｎ corporation	名称	ＣＰＵ基板
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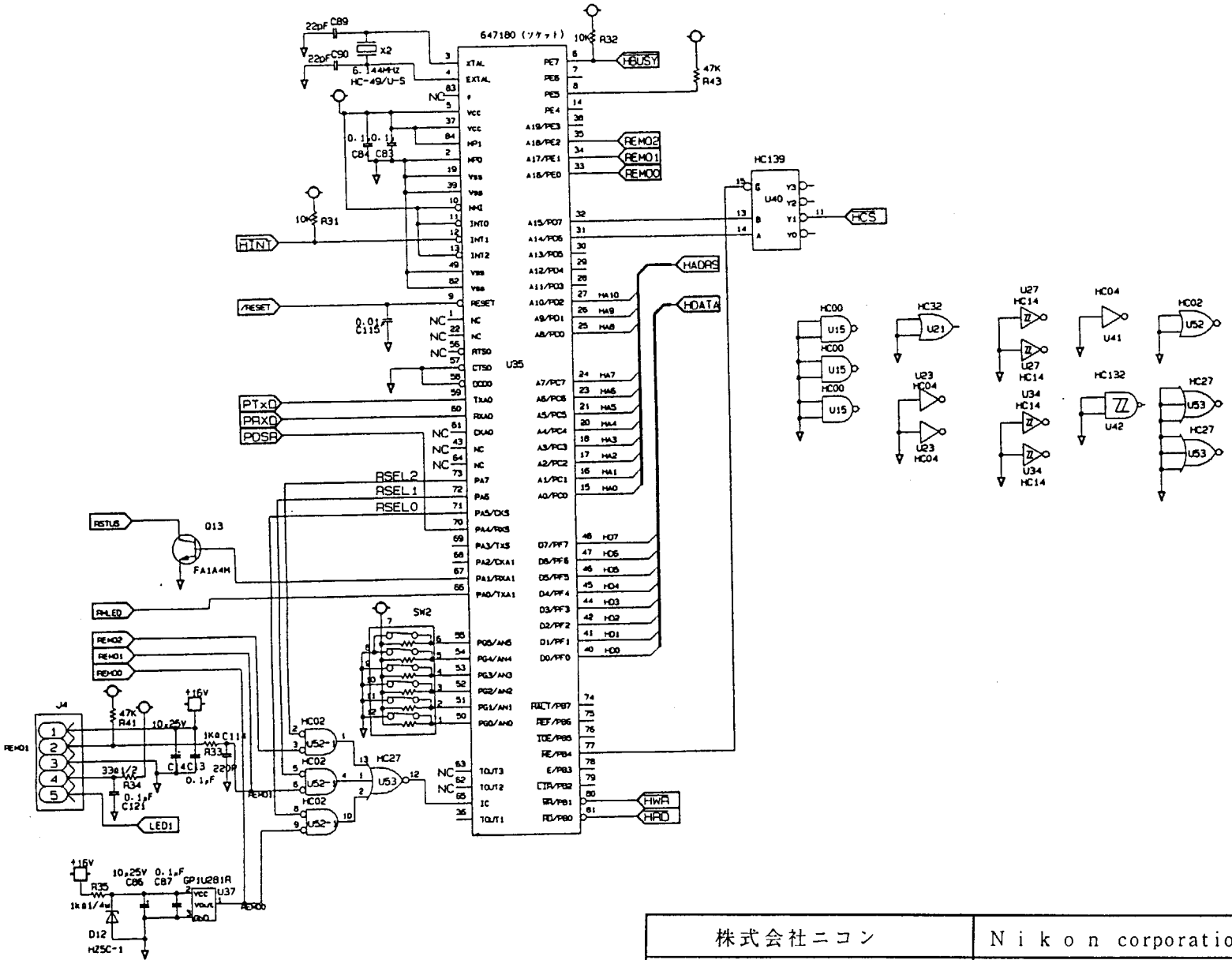
		Ｒｅｍｏｔｅ Ｖｉｓｉｏｎ	



株式会社ニコン	Ｎｉｋｏｎ corporation	名称	ＣＰＵ基板 5/5
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		Ｒｅｍｏｔｅ Ｖｉｓｉｏｎ	

株式会社ニコン	Nikon corporation	名称	LED 基板
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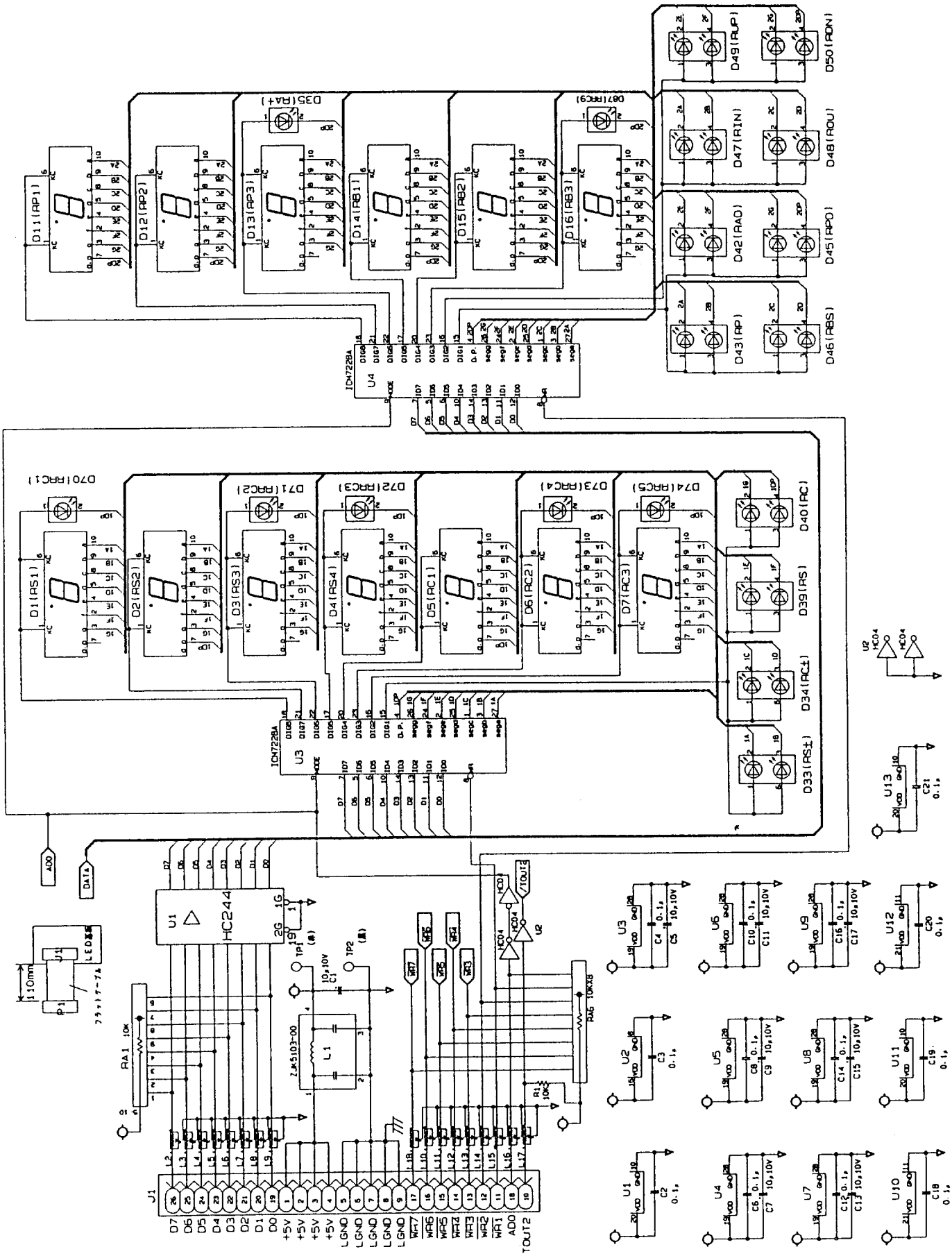
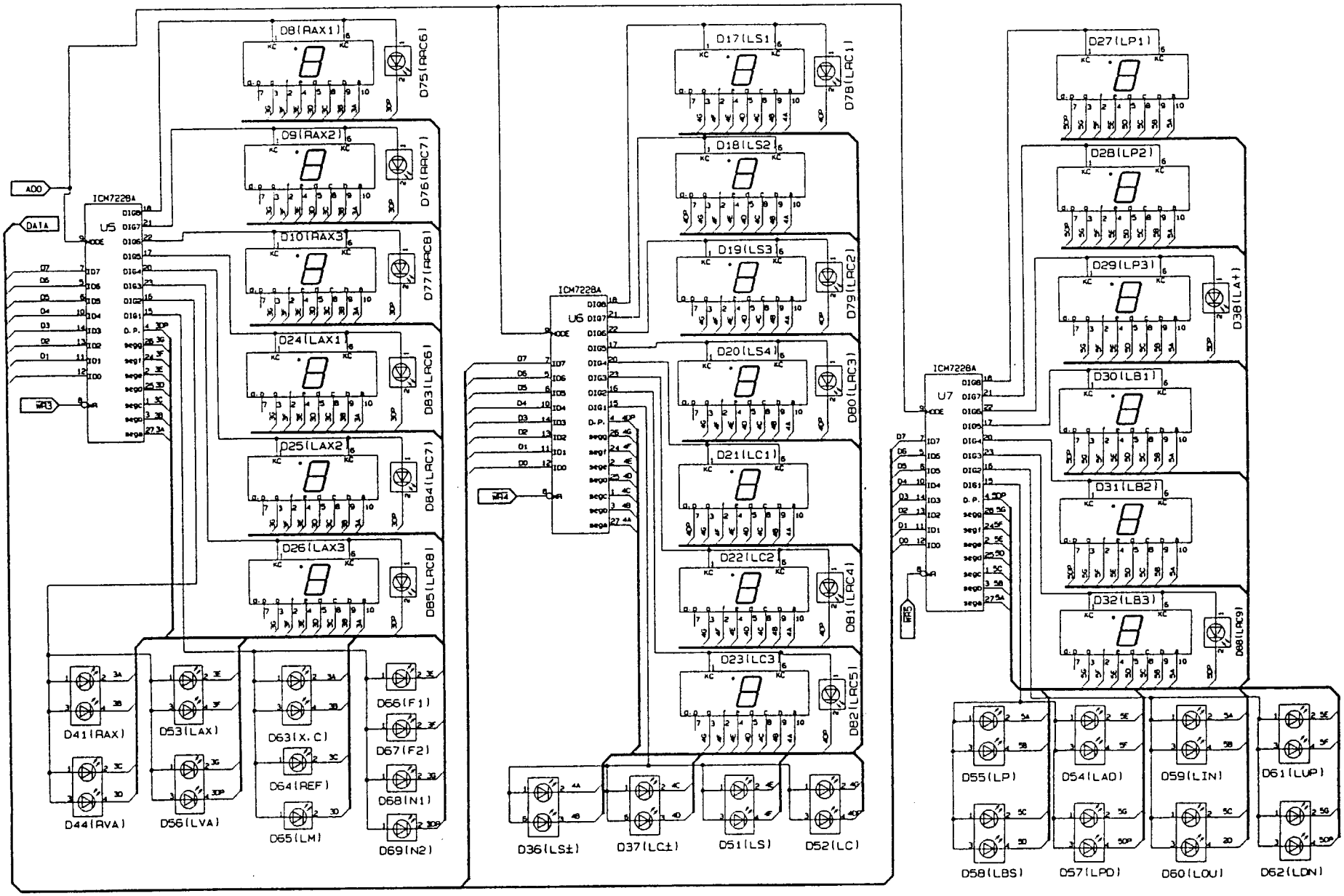
		Remote Vision	





株式会社ニコン	Nikon corporation	名称	LED 基板
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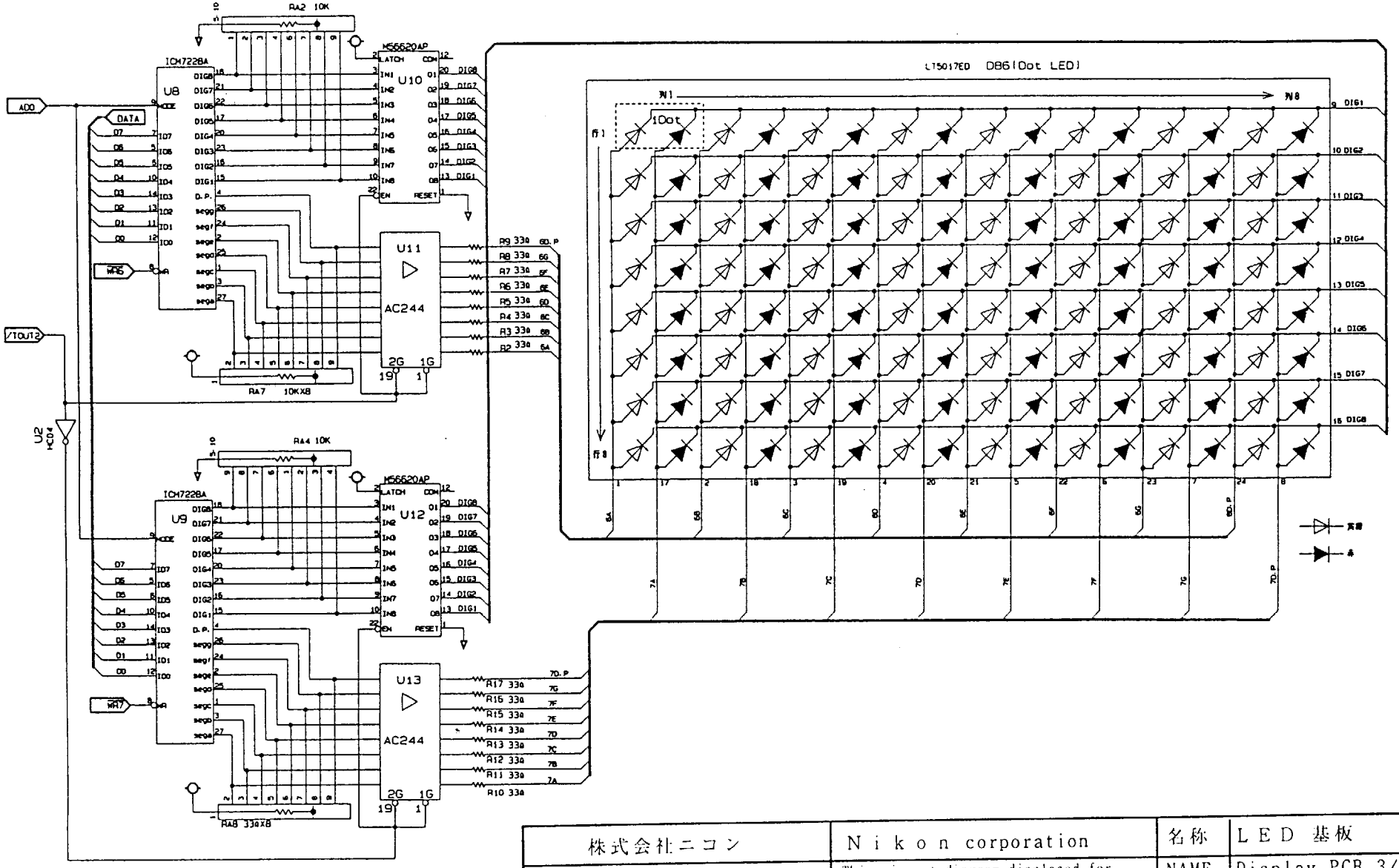
		Remote Vision	



株式会社ニコン	Nikon corporation	名称	LED 基板
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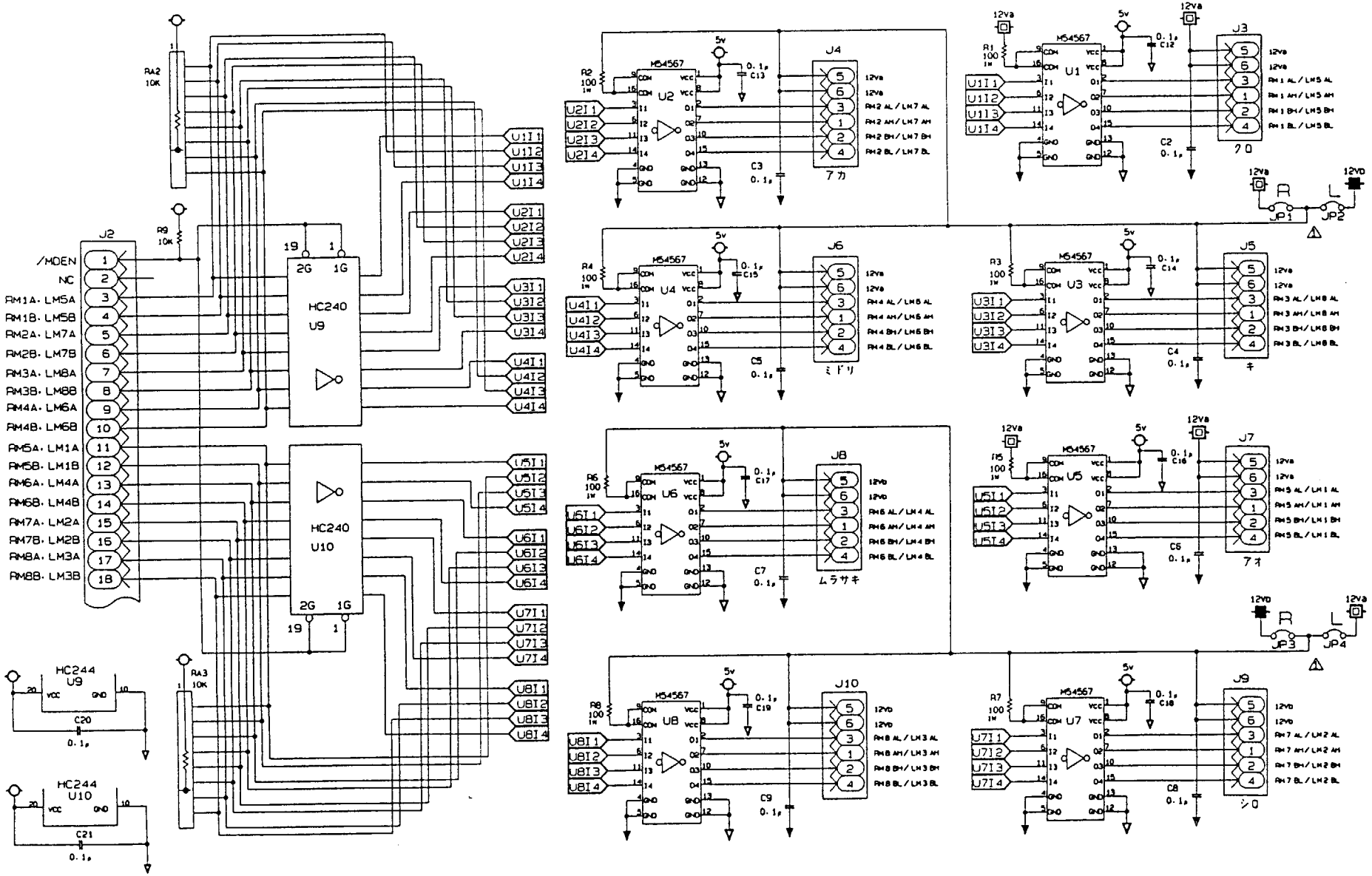
		Remote Vision	



株式会社ニコン	Ｎｉｋｏｎ corporation	名称	中継基板
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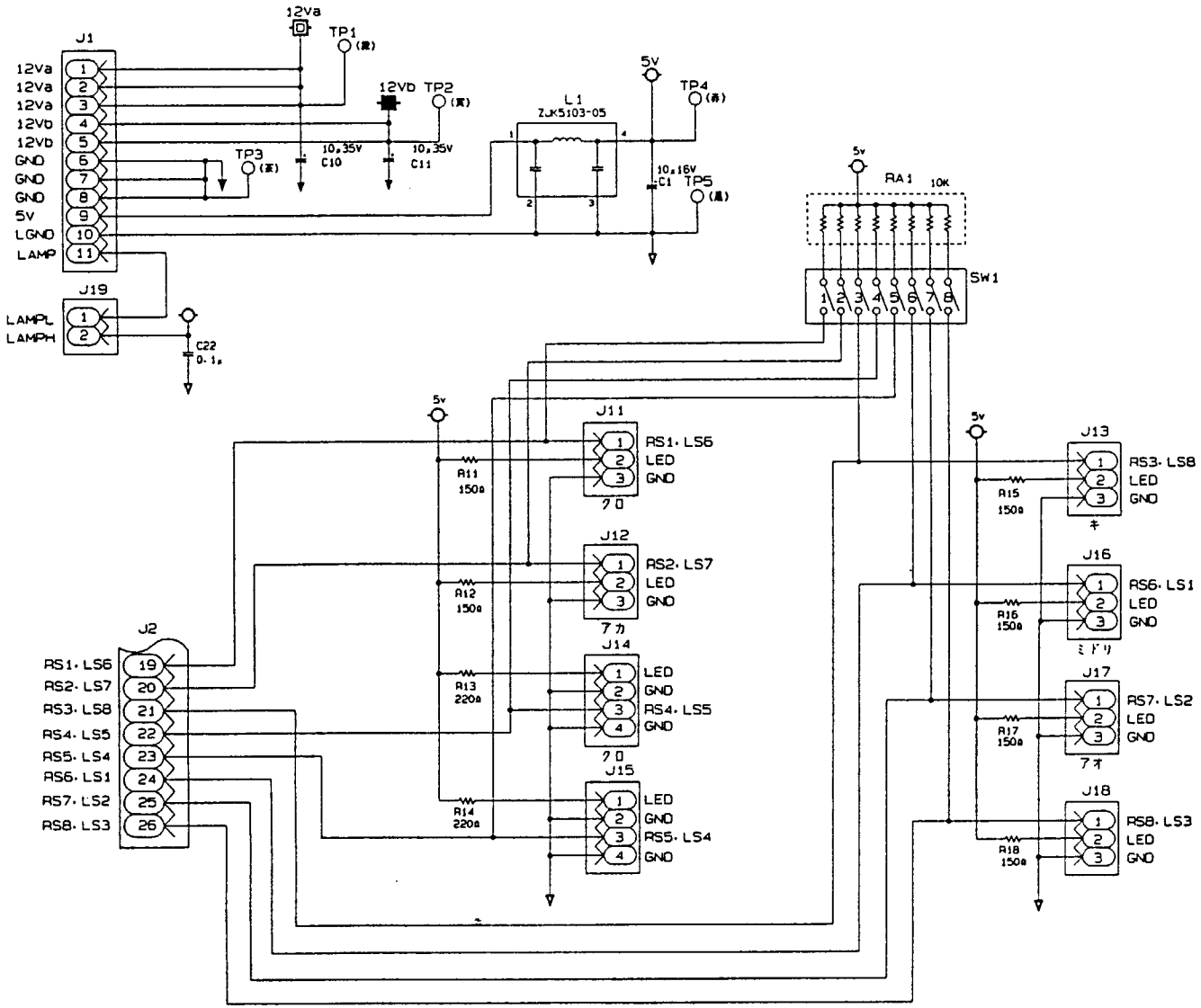
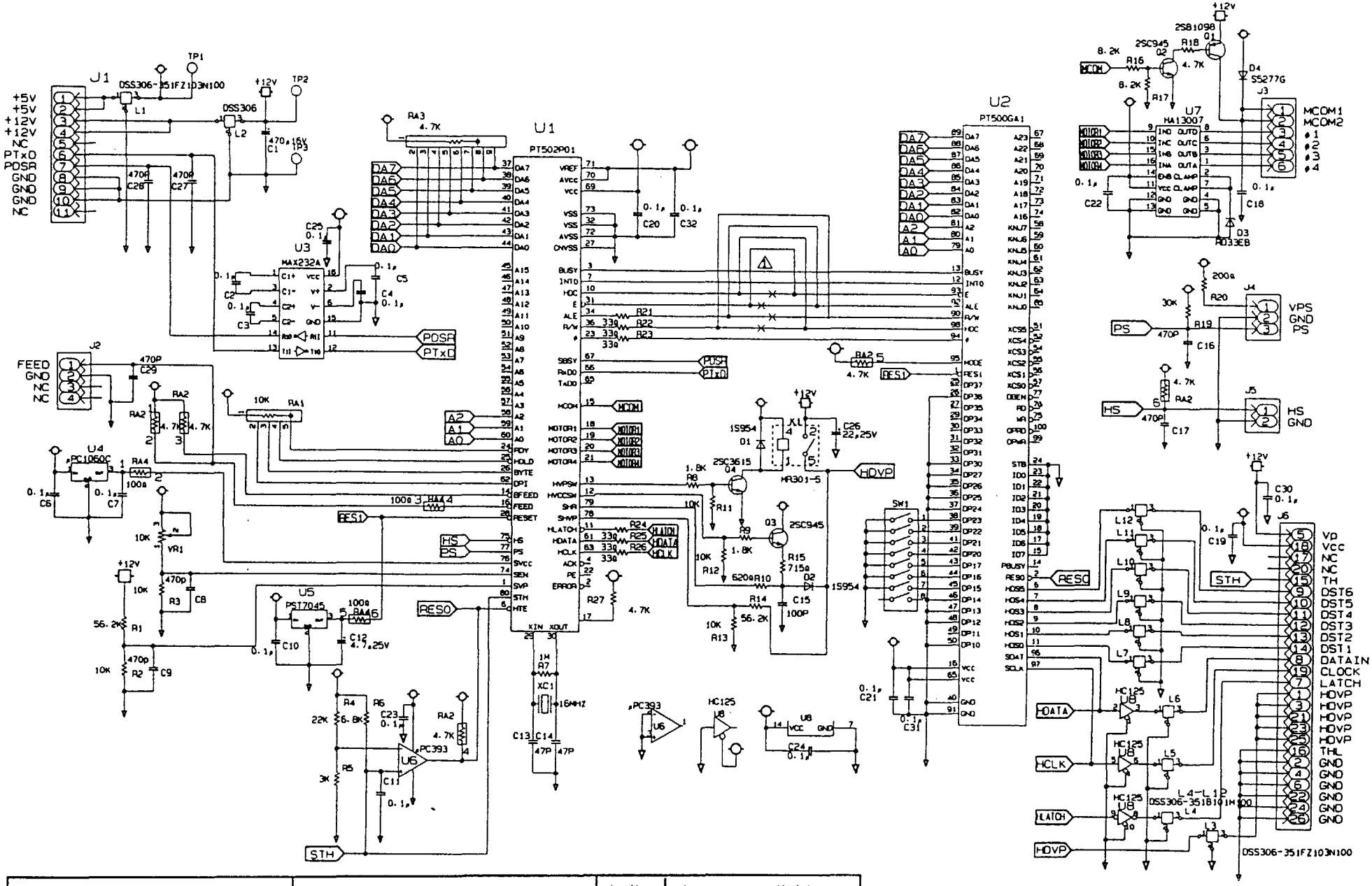
		Ｒｅｍｏｔｅ Ｖｉｓｉｏｎ	



株式会社ニコン	Ｎｉｋｏｎ corporation	名称	中継基板
この回路図は修理の目的の為のみに使用してください。保存、管理については十分注意され、他の目的の為にコピー、配布を行わない様、お願いします。	This circuit diagram disclosed for repair purposes only, Do not duplicate and distribute for other purposes taking special care for the strage.	NAME	Relay PCB 2/2
		Ｒｅｍｏｔｅ Ｖｉｓｉｏｎ	



株式会社ニコン	Ｎｉｋｏｎ corporation	名称	プリンター基板
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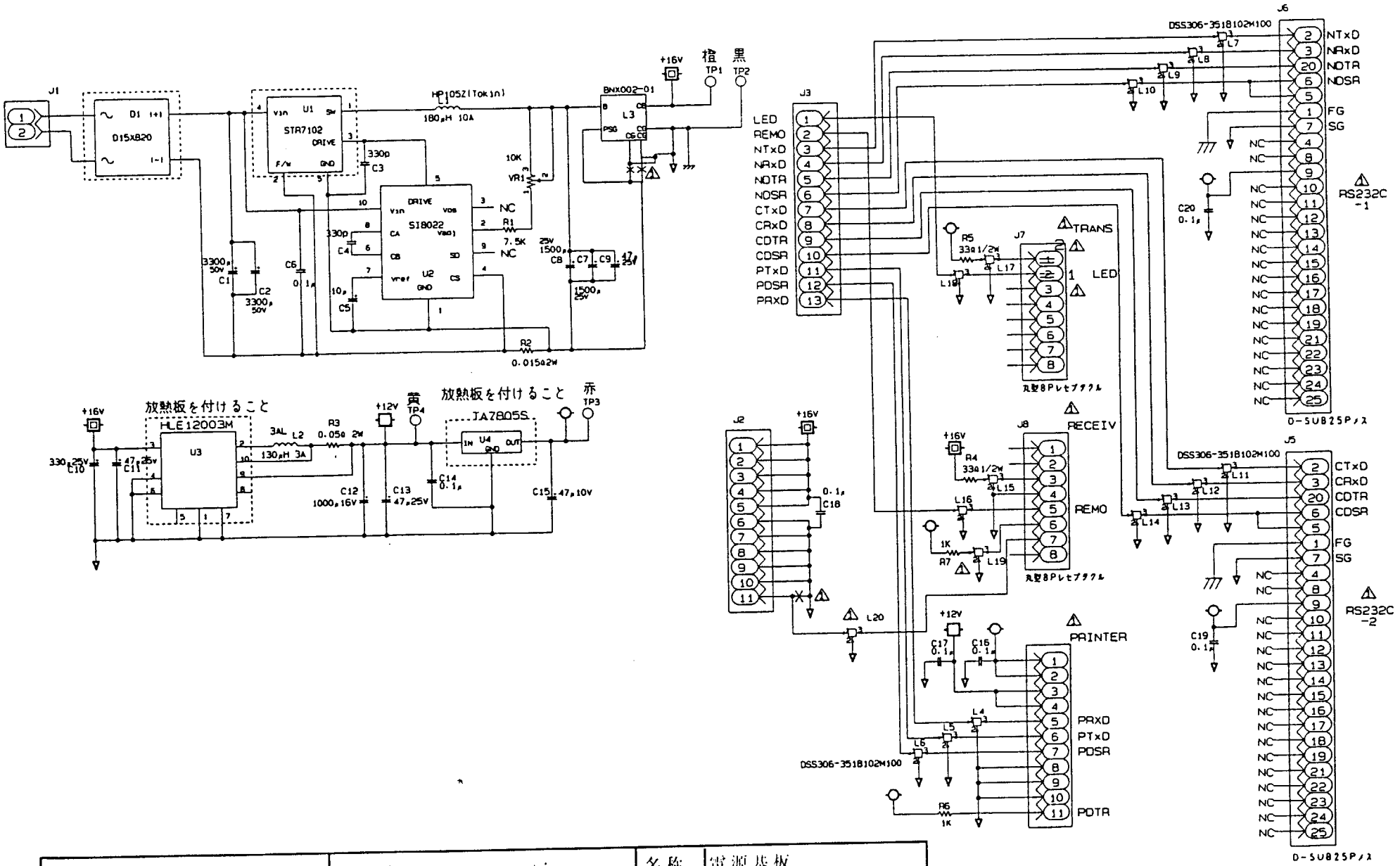
		Ｒｅｍｏｔｅ Ｖｉｓｉｏｎ	



株式会社ニコン	Ｎｉｋｏｎ corporation	名称	電源基板
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		Ｒｅｍｏｔｅ Ｖｉｓｉｏｎ	